OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

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VOLUME 39, NO. 12

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

Outstanding fastness to light
PONTAMINE* Fast Violet 4RL
For cotton or viscose rayon . . . in pale or heavy shades. PONTAMINE Fast Violet 4RL is especially well-suited to the production of deep reddish-violet and mauve shades. It can be used as a reddening element for beige, gray, and taupe shades.
Besides outstanding light-fastness, this dye has good resistance to laundering, dry cleaning, perspiration and dry crocking. It is readily soluble, has good absorption, penetrates thoroughly and yields level dyeing.
PONTAMINE Fast Violet 4RL is recommended for a variety of uses such as drapery and upholstery fabrics, sportswear and dress goods.
E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Div., Wilmington 98, Del.
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DuPont Dyestuffs
DUPONT
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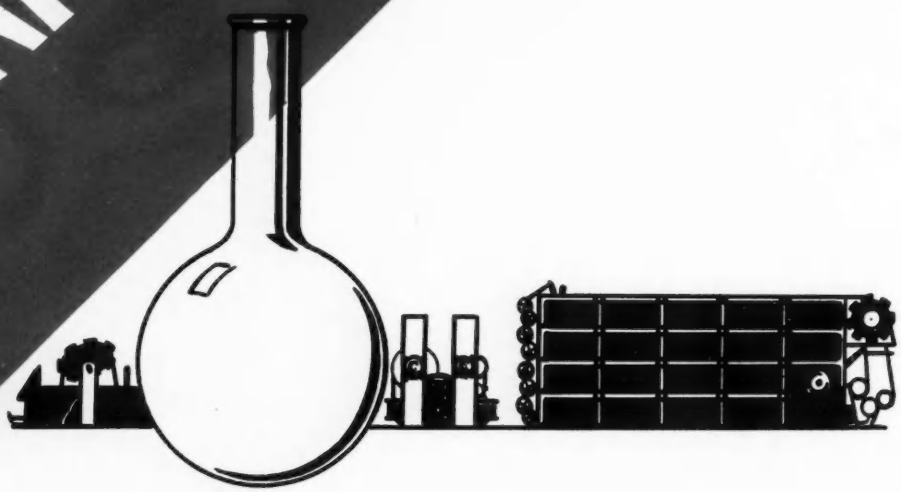
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

NAPHTHOLS



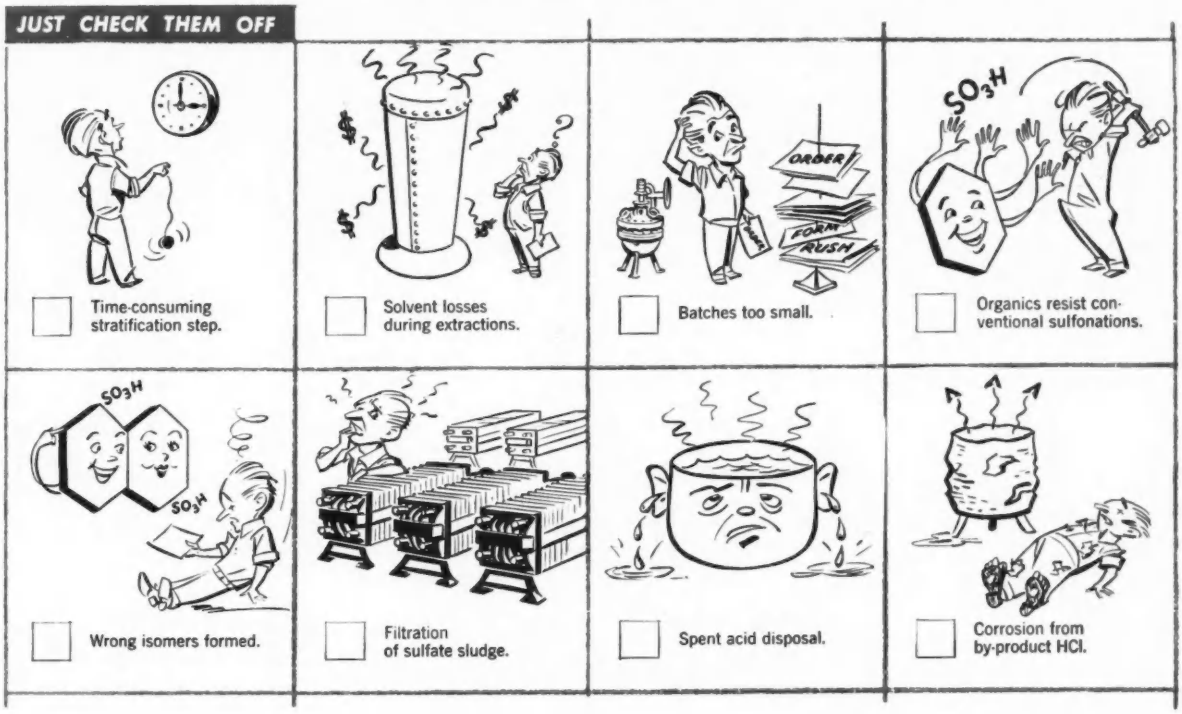
During the past 2 decades, the Pfister Chemical Works has rightfully earned a reputation for being able to supply Naphtols and Beta Oxy Naphthoic Acid "custom-tailored" to your requirements.

Pfister Chemical Works
INC.

RIDGEFIELD NEW JERSEY

If You SULFONATE ...You've Got Problems

JUST CHECK THEM OFF



☐ Time-consuming stratification step.

☐ Solvent losses during extractions.

☐ Batches too small.

☐ Organics resist conventional sulfonations.

☐ Wrong isomers formed.

☐ Filtration of sulfate sludge.

☐ Spent acid disposal.

☐ Corrosion from by-product HCl.

If you want to solve them, use Sulfan*

BASIC CHEMICALS

FOR AMERICAN INDUSTRY

General Chemical SULFAN, stabilized sulfuric anhydride, has helped many manufacturers solve their sulfonation problems. Its advantages and economies are evident in producing detergents, dyestuffs, pharmaceuticals, textile wetting agents, organics, plastics and other products.

You may find it has much to offer in your operations too. To study its benefits, draw upon the special application data General Chemical has available for various processes. A confidential letter outlining your special problems will enable us to compile material of greatest immediate value to you. Write today to—

Product Development Department

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Offices in Principal Cities from Coast to Coast

*"Sulfan" is General Chemical's registered trade-mark for liquid sulfur trioxide.

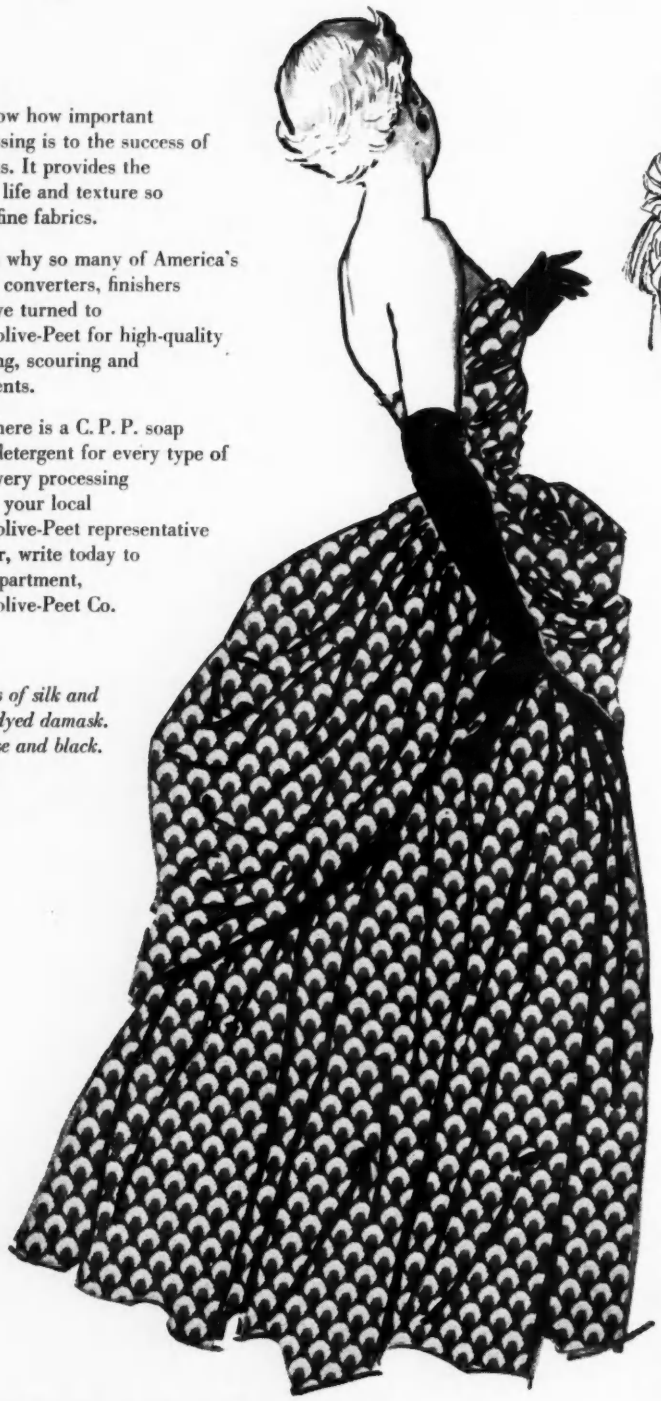
In every Fashion Show Processing plays a Leading Part

Designers know how important proper processing is to the success of their creations. It provides the extra beauty, life and texture so necessary in fine fabrics.

That explains why so many of America's leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

Remember, there is a C. P. P. soap or synthetic detergent for every type of fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for details. Or, write today to Industrial Department, Colgate-Palmolive-Peet Co.

This gown is of silk and rayon yarn-dyed damask. Comes in rose and black.



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COLGATE WHITE SOAP FLAKES

High-grade thin white flakes. Not milled or polished. 90% anhydrous soap.

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Synthetic detergents and wetting agents. Unsurpassed for many processing operations.

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92% oleic acid soda soap in flake form for silk degumming, wool scouring, all textile processing.

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Increasingly, the consumer is awakening to the realization that wool products should be shrink-resistant! A label that declares merely "100% Wool" is not enough. Today's consumer is demanding 100% Wool that is 100% Washable—as Safely Washable as any other fabric! And that means nothing less than soap-and-water-in-the-washtub—SCHOLLERIZED wool!

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Scholleized WASHABLE WOOL SAFE TO TUB • SAFE TO RUB

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• SERVING THE TEXTILE INDUSTRY SINCE 1907 •

Photograph courtesy Celanese Corporation of America. Yarn content: Warp — Celanese acetate rayon dull filament; Filling—Celanese acetate rayon bright staple.

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ARIPERM P M

Gives fabrics composed partially or wholly of

Acetate Rayon

— lasting protection against fading from atmospheric gases

— with excellent resistance to *WASHING AND DRY CLEANING*

Recommended for dyeing Light Shades, Pastels & Tints as well as medium and heavy shades.

With Ariperm P M there is no appreciable yellowing effect on white goods when exposed in the gas chamber—relatively little effect on light fastness of the color.

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Possessing extreme solubility and stand-up, AMANIL Napthols, along with AMANIL Fast Color Salts and Bases, insure trouble-free, wash-fast dyeings . . . meeting the most severe market requirements for colors of this type.

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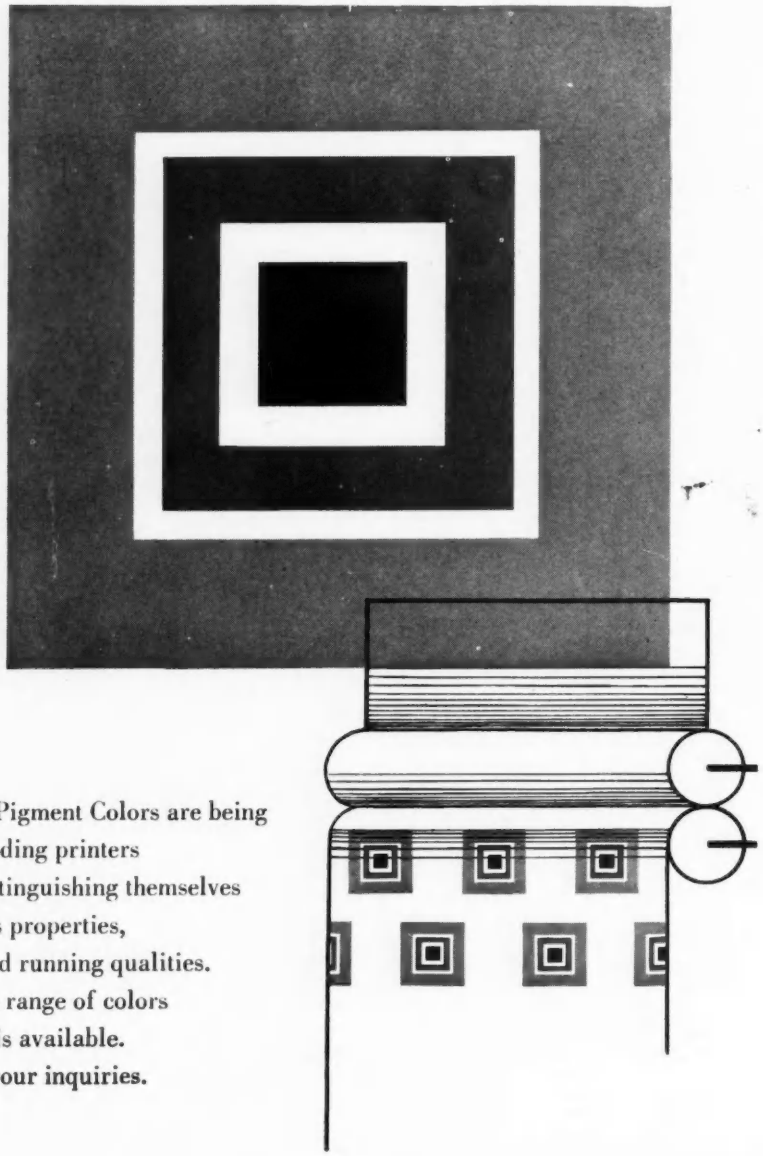

Suntone Pigment Colors are being
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A complete range of colors
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AHCOVELS are odorless and will not "yellow" whites.

AHCOVELS are permanently resistant to usual laundering and dry cleaning processes.

AHCOVELS are stable under extreme heat.

AHCOVELS E, F and R are both *anionic* and *substantive*. They assure full retention of light fastness in dyed fabrics and are compatible with anti-fume agents.

For economy . . . finer finishes . . .
softer drape and hand . . . use AHCOVELS.

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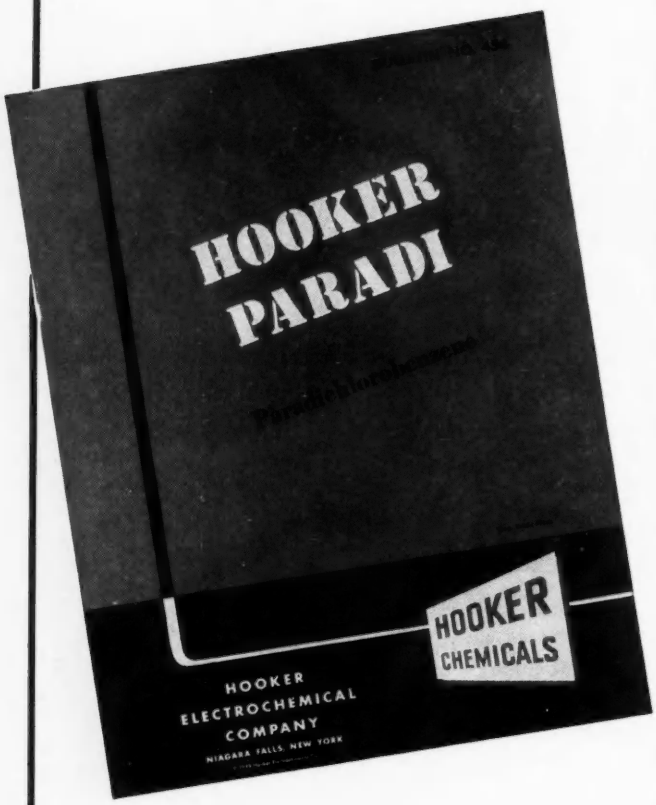
with Hooker Paradichlorobenzene



HOOKER's new Bulletin No. 454 on Paradichlorobenzene can be your guide to increased sales and profits if you are interested in the fumigant, deodorant and disinfectant markets. It describes the many uses and application of paradichlorobenzene, methods for reforming and repackaging—contains a table and illustrations of exact screen sizes—just the information a repackager or specialty manufacturer needs.

Hooker Paradichlorobenzene is a crystal clear, high purity product that evaporates completely, leaving no residue and no stains. It is not injurious to fabrics, furs or hides and is not poisonous to human beings.

It is made available in seven graduated sizes from powdered to Pea No. 1 (Screen size through 5/8" on 2½).

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HOOKER PARADICHLOROBENZENE

Appearance	White to clear transparent
Form	Crystals in 7 sizes
Melting Point	53°C
Boiling Point	173°C
Residue on Sublimation	None
Shipping Containers	25, 50, 100, 200 lb. Fibre Drums

A request on your company letterhead will bring this bulletin to you promptly. Chemists who are interested in other physical and chemical properties should ask for Technical Data Sheet 749.

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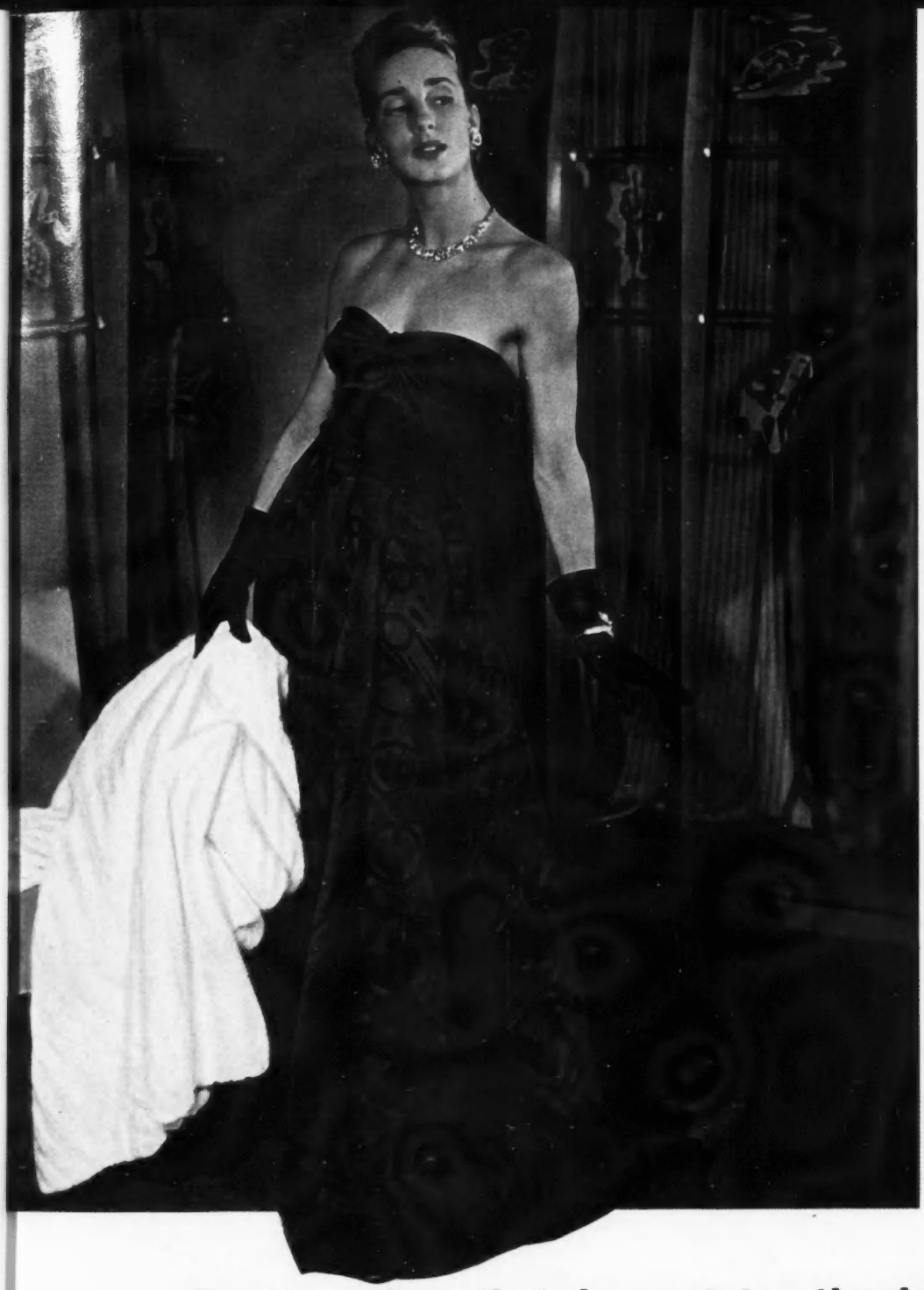

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Our technicians are available to visit your plant on request . . . Write for booklet.

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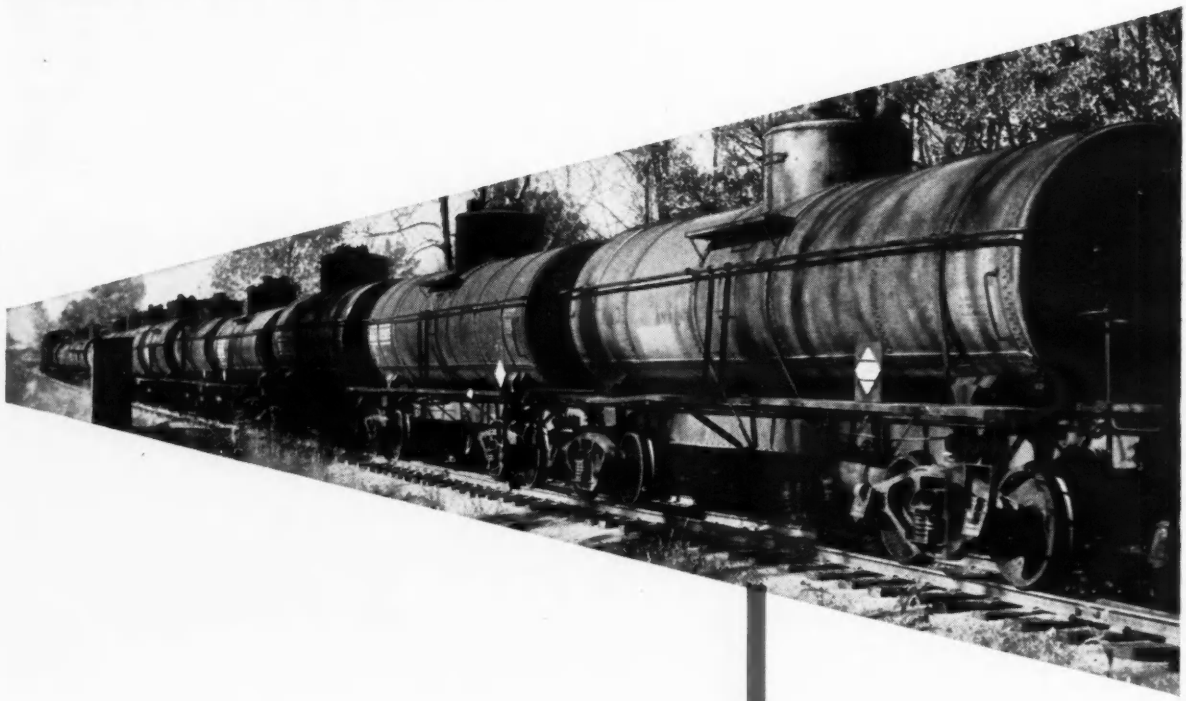
Are you a volume consumer

of synthetic detergents?



Are you interested in saving almost half of your detergent costs? Then ULTRAWET 35KX is your answer. This new member of the Atlantic family of alkyl aryl sulfonates is tailor-made to combine excellent performance and ease of handling.

ULTRAWET 35KX is a light amber slurry, containing a minimum of 35% solids of which 90% is active. The extremely low inorganic salt content insures a wide variety of uses, including textile processing, emulsion polymerization and as a charge stock for drying operations. The ingredient is a high molecular weight alkyl aryl sulfonate characterized by exceptional foaming, wetting and detergent qualities. An important feature is that ULTRAWET 35KX has a low haze point —90° F.—for ease in handling and storage.

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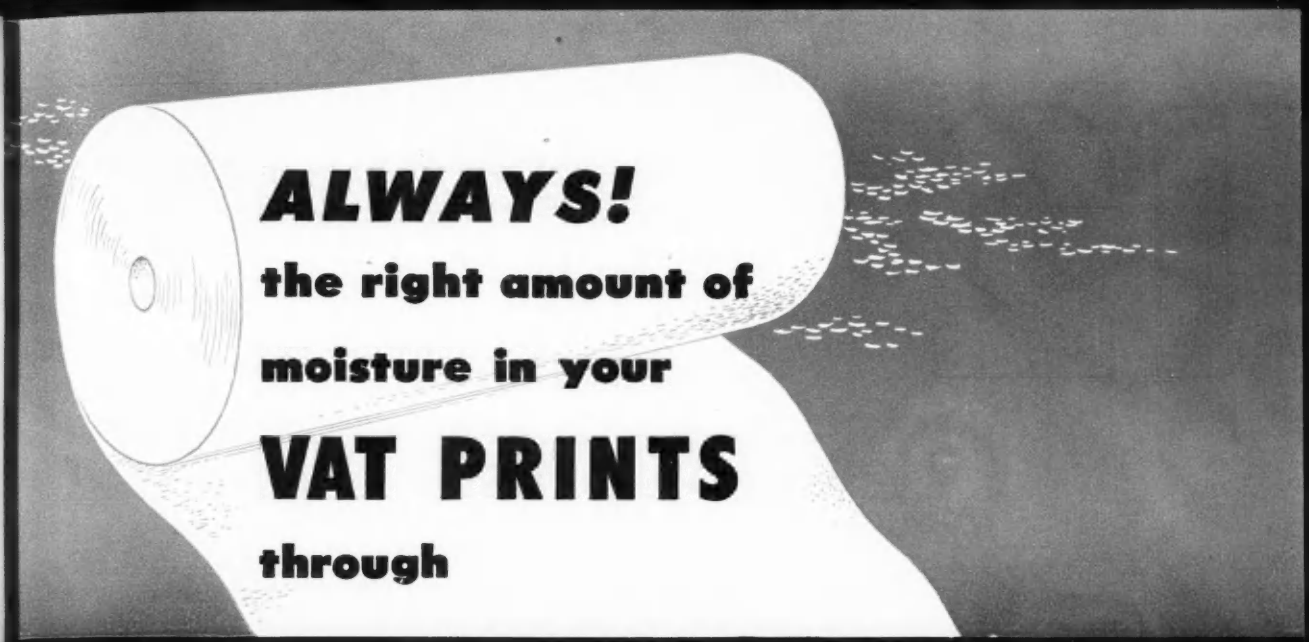

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Resembles glycerin in feel and appearance.

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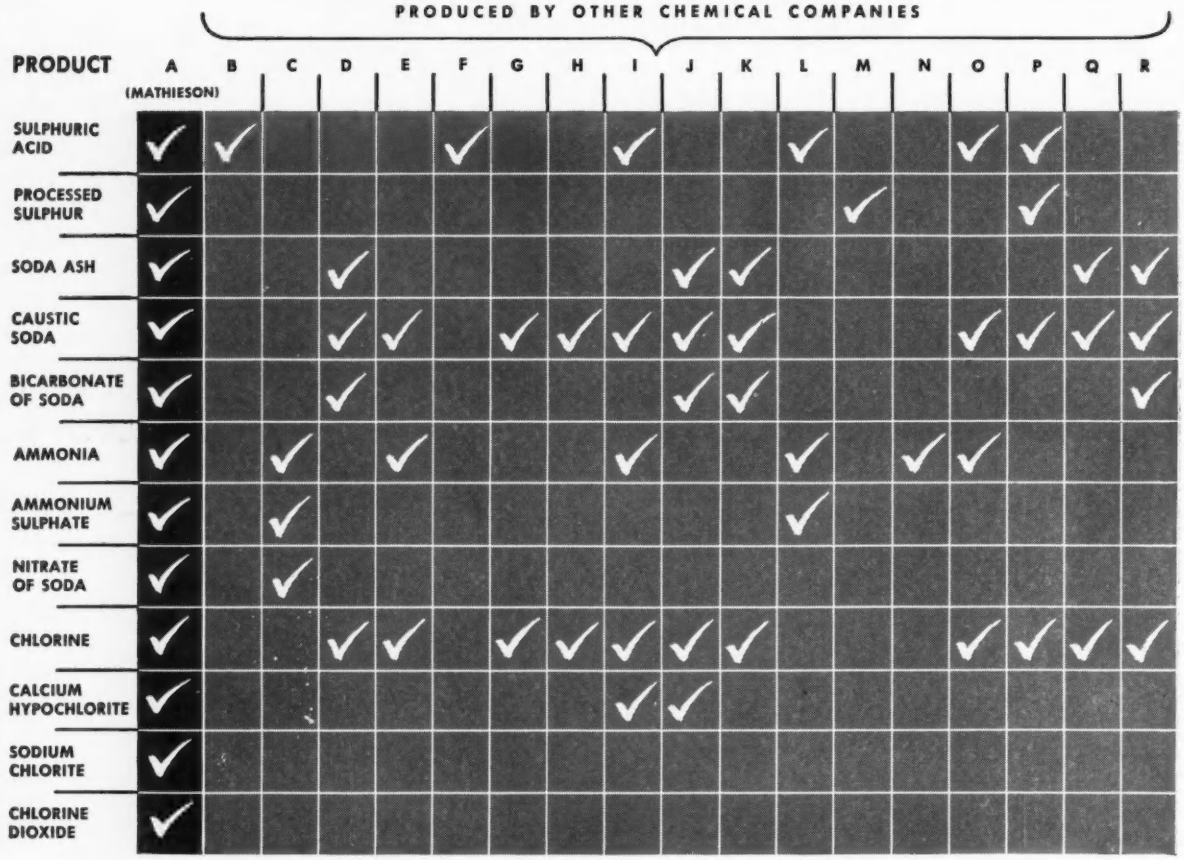

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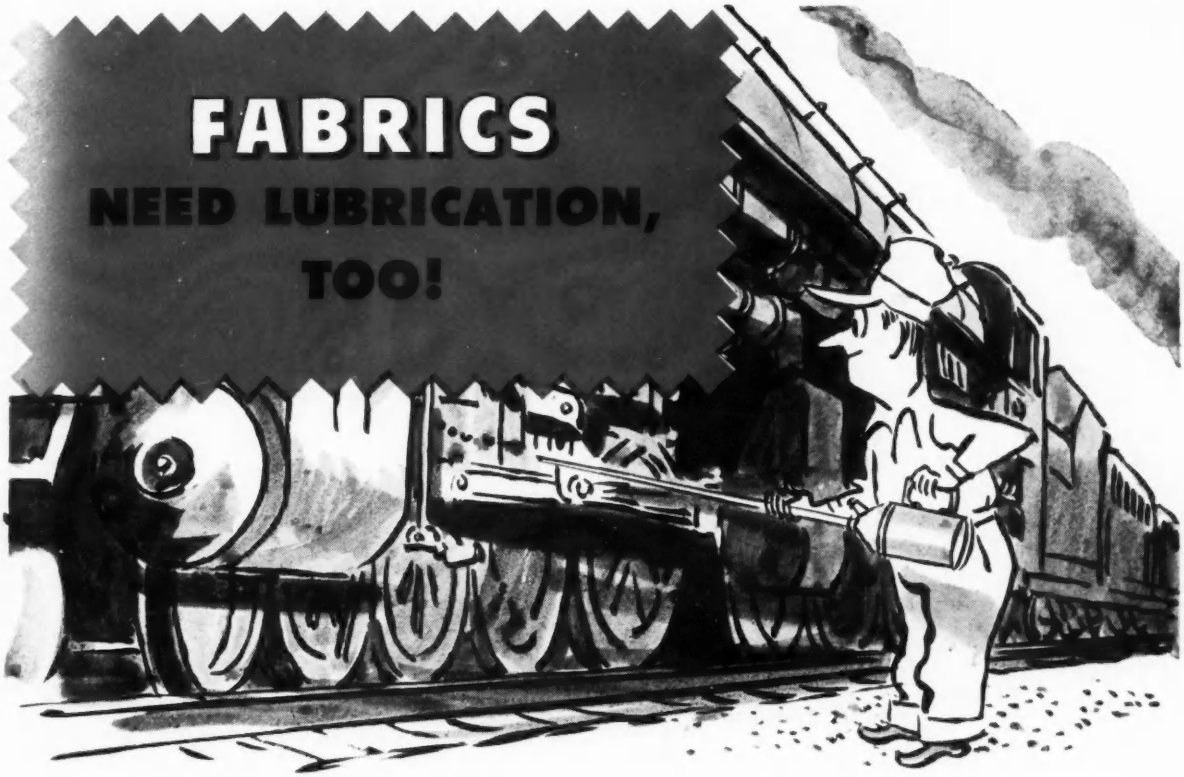

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STANTEX 125 **STANTEX 127**

STANTEX 152

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IGEPONS have high efficiency in low concentrations and save time and labor.

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2, 1950

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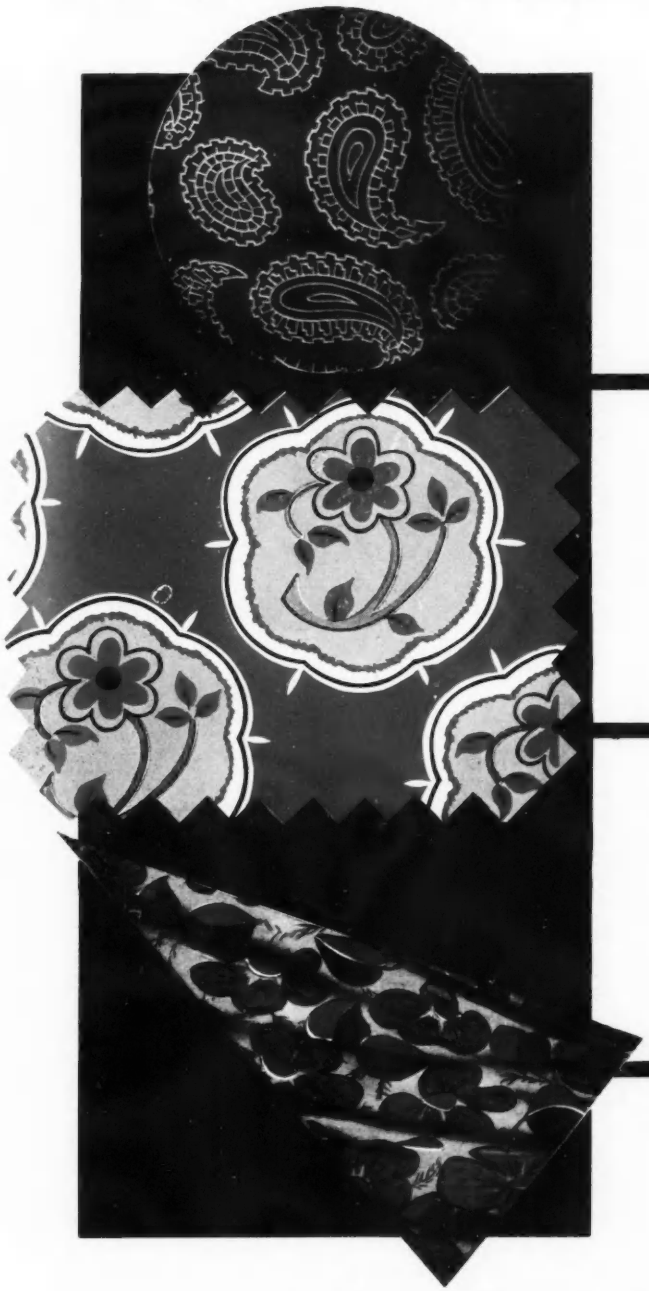

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on tie materials printed with acid, direct and acetate colors on acetate, viscose, wool and pure silk goods

TRUE, EVEN WHITES

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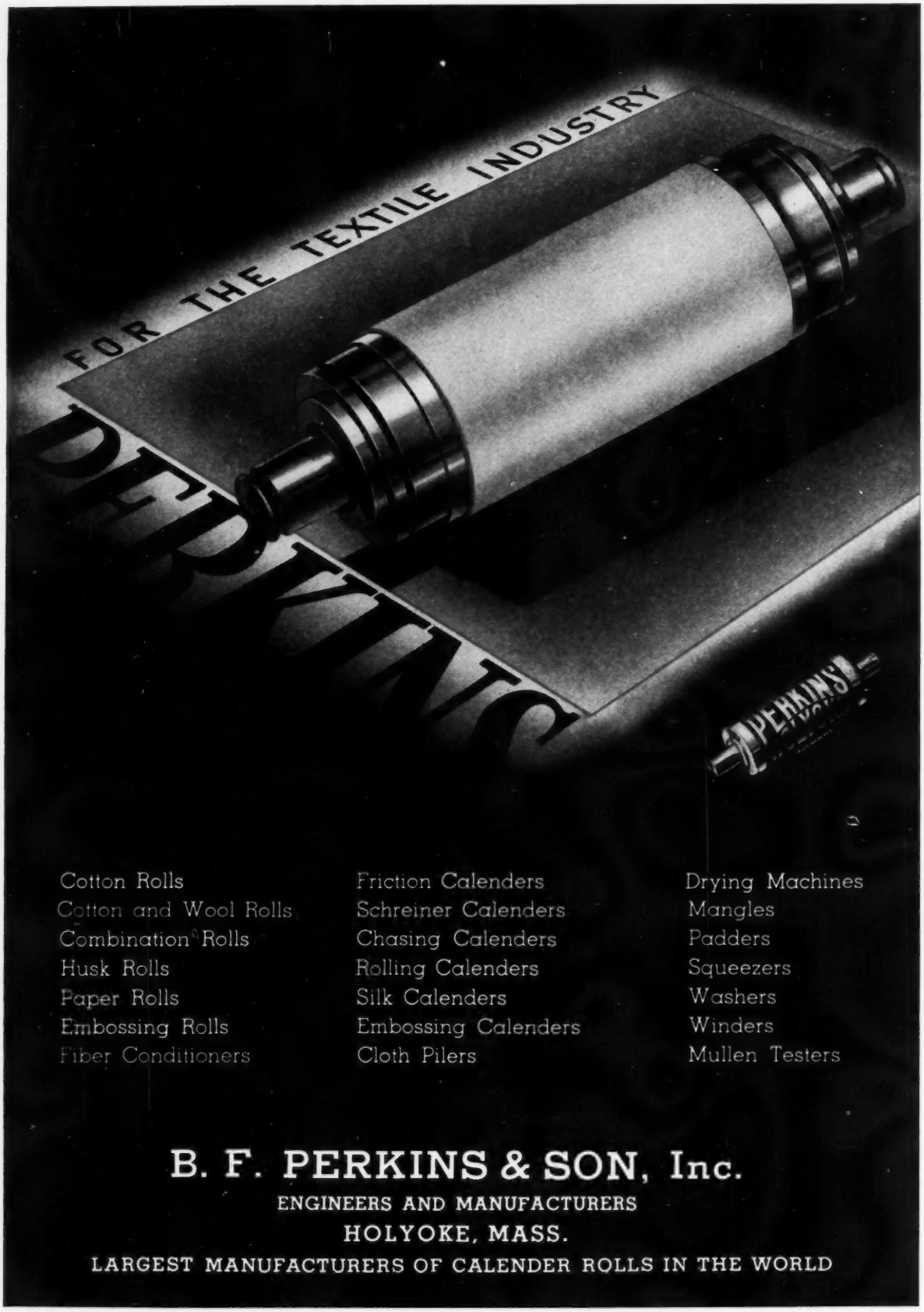

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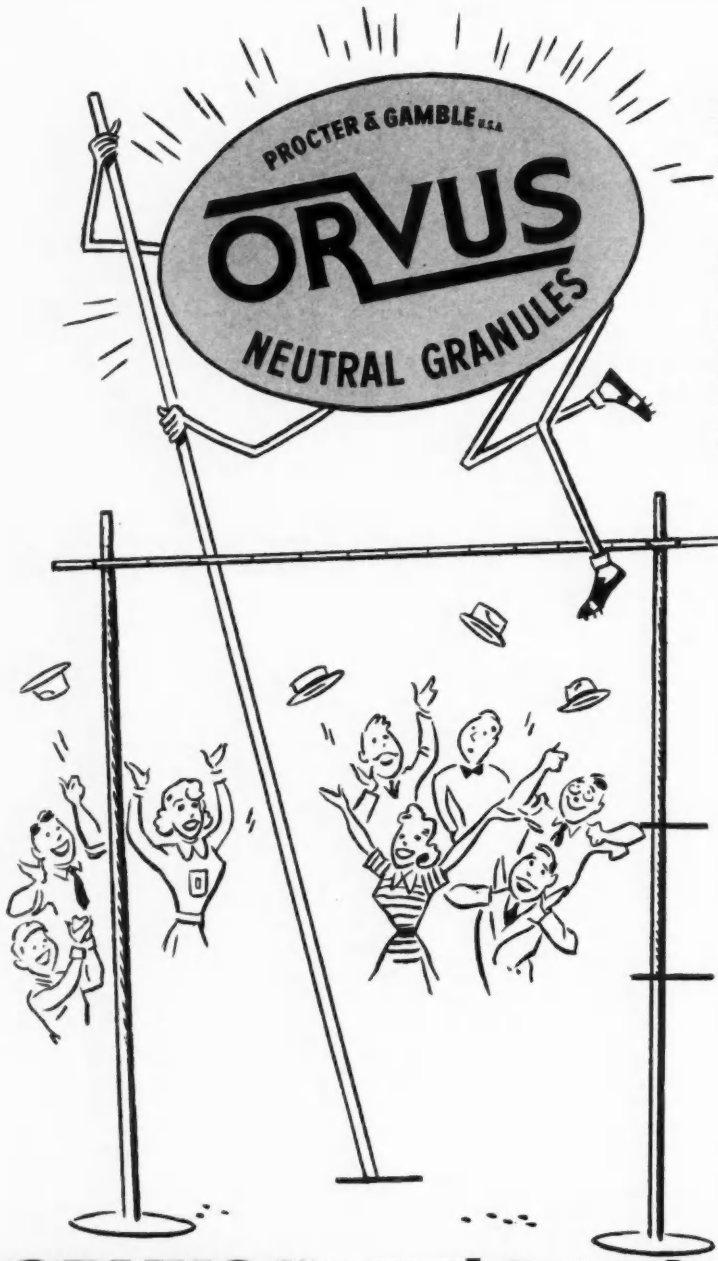

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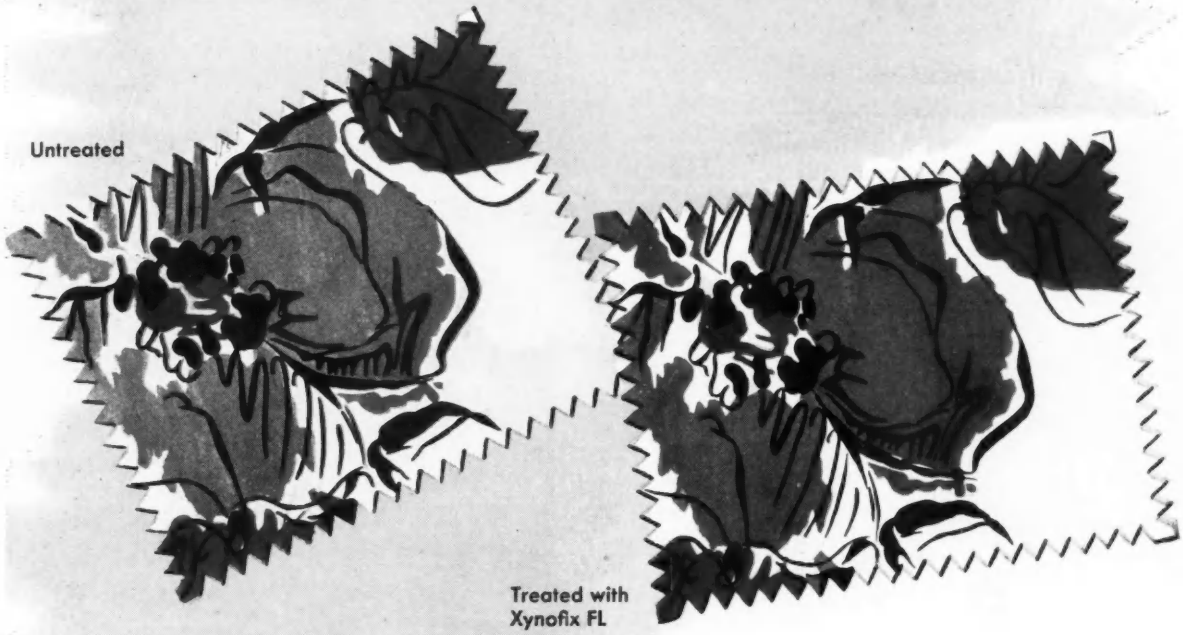

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JUNE 12, 1950
VOLUME 39 NUMBER 12

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COMPARATIVE DETERGENCY OF SURFACE-ACTIVE AGENTS ON WOOLEN CLOTH

KERMIT S. LaFLEUR

The comparative detergency of most of the distinct chemical types of surface-active products was determined for woolen cloth soiled with the oil used in its manufacture (a typical, economical, self-emulsifying mineral oil*), using an Atlas Launder-Ometer. The comparisons were made on the basis of concentration and money-value, and include trials without a 'builder'; with an alkaline 'builder' (sodium cabonate); or with a neutral 'builder' (sodium chloride). Neutral scouring with a polyoxyethylene thioether using sodium chloride as a builder was found to be very effective for removing the specific soil; the combination was superior to all others examined, both on a concentration and money-value basis. Since the solubility of the polyoxyethylene thioether was considered inadequate for a standing solution, particularly one containing sodium chloride, a combination of this product with another efficient nonionic material of good solubility (an alkyl aryl polyoxyethylene condensate) was selected as optimum for effectiveness and stability. The optimum concentration of detergent and builder for the specific soil at the specific level (approximately 6%) was found to be 0.5% and 4% respectively on the cloth weight; the optimum pH for the system, as determined with acetic acid or sodium carbonate, appears to be about 7.

Limited mill experiments have confirmed the laboratory finding: a one ounce per gallon solution of the selected detergent combination containing 5 ounces per gallon of sodium chloride very effectively removes mineral oil soil.

INTRODUCTION

THE undesirable properties of alkaline soap solutions used for scouring woolen cloth (i.e., susceptibility of soap to precipitation in hard water, poor emulsifiability of such precipitates, and high pH of the solutions toward which wool shows poor resistance, resulting in alkaline goods of low resistance to bacterial damage as well as excessive bleeding of stock-dyed colors) are quite generally recognized; however there has been a considerable reluctance to change to more stable detergents in less alkaline media, partly because of shortcomings in the newer products (e.g., relatively poor pigment removal), but largely in fear of losing desirable qualities long associated with soap (e.g.-efficiency as a fulling assis ant, softness of the finished product). Partial replacement of soap with other types of surface-active agents is now becoming more generally tolerated, and such a trend may increase gradually to the point of complete soap replacement. To the chemist responsible for achieving and maintaining a high level of uniformity and quality in woolen piece goods, the need for hastening this change often seems urgent. Continued search for a chemically inert detergent highly effective in neutral or slightly acid media is clearly important.

EXPERIMENTAL PROCEDURE

Twenty-eight products were selected as representative of individual chemical types from the several hundred surface-active agents currently available. The recommended end-use of each product (whether for wetting, detergency or emulsifying) was disregarded as in a previous study on wetting*(1)*, to allow examination of as many distinctly different types as possible, and in the hope that some of the obscure relationships between structure and efficiency might be clarified.

The money-value comparisons were based upon a 0.5 percent solution of a 92 percent flake sodium soap made from 25° titer fats, and priced at 13 cents per pound. All solutions compared on this basis contained a builder, either sodium chloride*(2)* or sodium carbonate. Some prices have been lowered since the comparisons were made.

From preliminary experiments using 0.05, 0.1, 0.2 and 0.4 percent detergent solutions without builders, the minimum concentration necessary for moderate removal of soil under the experimental conditions seemed to be 0.2 percent (active organic ingredient basis†). Accordingly, comparisons on a concentration basis, and studies on the relative effects of sodium chloride and sodium carbonate were made at this level. Selection of such a specific, common detergent concentration might be criticized on the basis that no single concentration could reveal detergency differences accurately, since some products which appear to be poor may be approaching a concentration at which they would perform well; while some which appear to be effective might either have just become so at the concentration used, or might have been effective at a lower concentration. However, a glance at figure 1 will show that between the concentrations of 0.05 and 0.2 percent, the detergency curves are relatively flat and approximately parallel, indicating that a comparison anywhere within this range would be acceptably valid.

Ten-gram swatches of 16 ounce, loom-state woolen cloth, manufactured from stock oiled with a self-emulsifying mineral oil, were scoured in 10 to 1 solutions of the various detergents at 100°F. for 30 minutes in an Atlas Launder-Ometer. The swatches were then folded double, covered with paper towelling, and passed through a wringer which was adjusted to leave a residual moisture content of approximately 100% on the dry weight of the cloth. Scouring was followed first by a 10 minute rinse, then by a 15 minute rinse in 15 to 1 baths at 100°F. in

* Woolrex 2000, Socony-Vacuum Oil Co.

† No product containing inorganic salt was used in these tests. All of the products except the soaps and the fatty acid amine condensate gave approximately neutral water solutions.

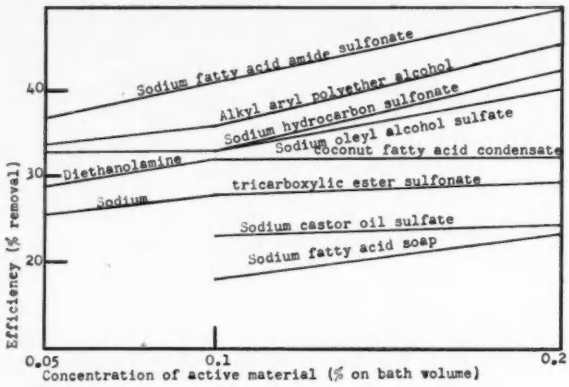

Figure 1
Relative Efficiencies of Selected Detergents (Without Builders) on a Concentration Basis

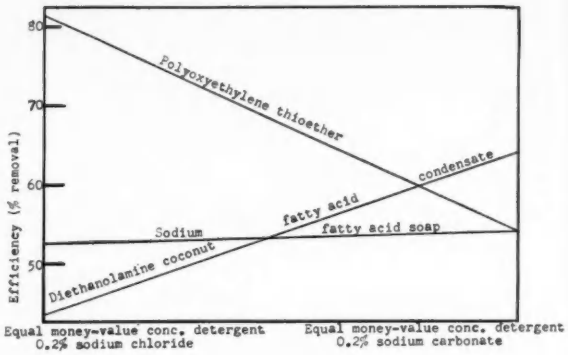

Figure 2
The Disparity of Effect of Sodium Chloride and Sodium Carbonate Upon the Detergency of Three Types of Surface-Active Agents

the Launder-Ometer; and finally by a rinse in running water at faucet temperature for 1 hour. The swatches were wrung after each rinse as described above.

Petroleum ether extractions were made with Soxhlet apparatus after air-drying and the percent removal of ether-soluble material was calculated from the mean value of 5.91 percent residue present before scouring.

Data are given in Table I. All results are the mean of at least two trials.

DISCUSSION OF RESULTS

It is clear from the data that addition of either sodium chloride or sodium carbonate modifies the effectiveness of surface-active agents as detergents to an unpredictable degree: as an extreme example, compare the conforming family of curves in Figure 1 with the diverse curves in Figure 2. The 0.2 percent sodium carbonate level seems to yield maximum efficiency with the soil being removed, while 0.4 percent sodium chloride in general appears to be notably superior to 0.2 percent.

In an alkaline solution, and on a money-value basis, soap is surpassed only by an amine-fatty acid condensate of the type described in the Kritchevsky patent(*3*). This product is classed as a nonionic material of good stability, but chemical examination indicates that it contains a mixture of intermediate reaction products, and that the amine soap may constitute a significant proportion of its weight. Thus, while it appears to be superior to soap, it is not wholly free from the faults of soap.

Superior performance was noted in the case of a polyoxyethylene thioether* solution containing sodium chloride. This combination was the most effective one found both on a money-value and concentration basis. Unfortunately, the solubility of the detergent is poor, and separation occurs within a short period in a standing bath.

An alkyl phenol polyoxyethylene condensate** was found to be the second most effective detergent for mineral oil

* Sterox No. 6, Monsanto Chemical Co.(*4*).
** Penepon C-300, General Dyestuff Corp.(*5*).

TABLE I
RELATIVE DETERGENCY OF SURFACE-ACTIVE PRODUCTS ON WOOLEN CLOTH OILED WITH A SELF-EMULSIFYING MINERAL OIL

		Efficiency (% removal of petroleum ether soluble material)					
		*0.2% detergent**		*Equal money-value detergent*			
No.	*Type of Detergent*		*0.2% NaCl*	*0.2% Na_2CO_3*	*0.2% NaCl*	*0.4% NaCl*	*0.2% Na_2CO_3*	*0.4% Na_2CO_3*
1	Sodium fatty acid soap	23	27	36	53	67	54	46
2	Sodium toll oil soap	28	25	35			51	
3	Sodium rosin acid soap	15	21	23			39	
4	Sodium castor oil sulfate	24	27	45			38	
5	Sodium fatty acid ester sulfonate	..**	63	54			48	
6	Sodium fatty acid amide sulfonate	49	64	59	57	69	49	50
7	Sodium oleyl alcohol sulfate	40	61	56	60	59	44	
8	Sodium tetradecyl secondary alcohol sulfate	32	33	48			41	
9	Sodium tricarboxylic ester sulfonate	29	41	57			38	
10	Dioctyl sodium sulfo succinate	33	61	58	43	30	39	
11	Dioctyl sodium phosphate	20	12	35			33	
12	Sodium alkyl aryl sulfonate	40	56	51	55	66	43	39
13	Triethanolamine alkyl aryl sulfonate	43	57	53			44	
14	Sodium hydrocarbon (alkyl) sulfonate	42	57	51			45	
15	Sodium alkyl aryl polyether sulfate	40	60	47	34	54	46	
16	Hydroxylated fatty ester	44	64	58	57	64	48	
18	Diethanolamine-coconut fatty acid condensate	39	40	47			46	
17	Protein derivative-fatty acid condensate	32	49	77	44	50	64	69
19	Sorbitan monolaurate	27	17	46			40	
20	Polyoxyethylene sorbitan mono-oleate	35	34	53			43	
21	Alkyl aryl polyether alcohol	45	57	49	54		47	
22	Alkyl phenol polyoxyethylene condensate	45	63	50	58	71	49	51
23	Polyoxyethylene thioether	49	82	54	82	90	54	56
24	Polyethylene glycol tertdodecylthioether	41	61	48	57		48	
25	Polyoxyethylene esters of mixed fatty & resin acids	25	37	46			42	
26	Polyoxyethylene lauryl alcohol	27	28	43			41	
27	Polyethylene glycol ether of wool wax alcohols	19	30	39			..***	
28	Dodecyldimethyl amine oxide	16	12	52			39	
	Sodium chloride		37					
	Sodium carbonate			41				
	Water	27						

* Based on percent active ingredient.
** Not wholly salt-free.
*** No price available.

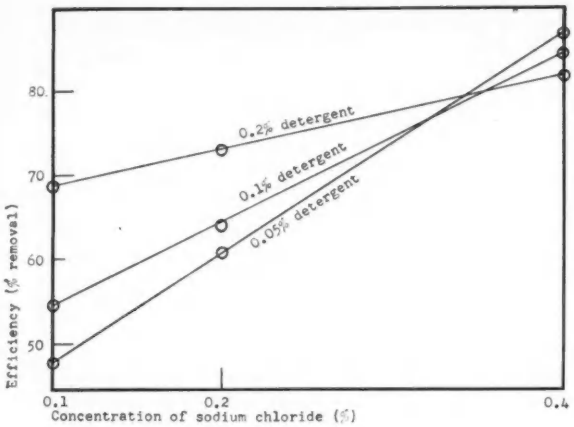

Figure 3
Removal of Mineral Oil Soil as a Function of Detergent and Salt Concentration, Using the Selected Detergent

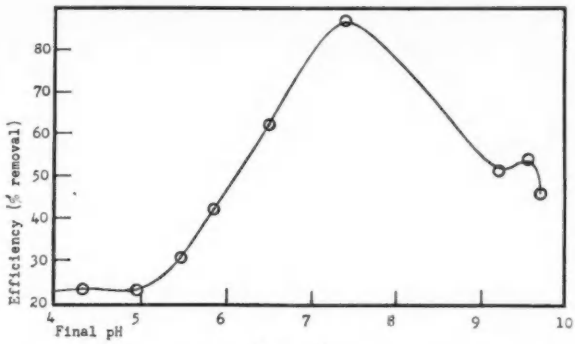

Figure 4
Removal of Mineral Oil Soil with the Selected Detergent as a Function of pH

TABLE II
STABILIZING EFFECT OF AN ALKYL PHENOL POLYOXYETHYLENE CONDENSATE (P) ON A POLYOXYETHYLENE THIOETHER (S) SOLUTION

Conc. S (g/l)	*Conc. P (g/l)*	*Water solution (initial)*	*Stability*	*Plus 40g/l NaCl*	*Stability*
5	0	turbid	settles	v. turbid	settles
4	1	hazy	settles	turbid	settles
3	2	sl. hazy	stable	hazy	stable?
2.5	2.5	clear	stable	v. sl. hazy	stable
0	5	clear	stable	clear	stable

soil, on a money-value basis. This product is highly soluble and stable.

It seems likely that a combination of these two products should give a detergent of superior properties. Table II establishes the approximate proportion of each at equal parts.

OPTIMUM CONCENTRATION OF DETERGENT AND SALT

The effect of varying the concentration of the selected detergent combination and the sodium chloride upon the degree of soil removal was next studied (see Table III). From Figure 3 it can be seen that the slope of the scouring efficiency curves becomes steeper with decreasing detergent concentration, and that at 0.4 percent sodium chloride concentration, 0.05 percent detergent is more effective than either 0.1 or 0.2 percent.

OPTIMUM pH OF THE SELECTED DETERGENT SYSTEM

The optimum pH for the system examined seems to be about 7, when the hydrogen-ion concentration is adjusted with acetic acid or sodium carbonate (Table IV, Fig. 4). From additional experiments with other detergents (e.g., the alkyl phenol polyoxyethylene condensate) and other acids (e.g., sulfuric acid), it appears that the curve in Figure 4 is not generally characteristic, but applies only to the system examined; it further seems probable that the nature and concentration of the acid used to adjust the pH are factors fully as important as the pH upon the results.

THE MINERAL OIL SOIL

The wool oil used in these experiments is a proprietary product containing approximately 80-85 percent mineral oil; the emulsifier is claimed to be based upon fats, with no mineral oil sulfonates. This description is not sufficiently precise to justify interpretations beyond actual findings.

To demonstrate the effectiveness of the outstanding detergents found upon a known mineral oil soil, a wool oil consisting of 90 percent solvent refined mineral oil (commercial grade) of 100 seconds Saybolt viscosity at 100°F, 7 percent polyoxyethylene sorbitan trioleate* and 3 percent polyoxyethylene sorbitan

* Tween 85, Atlas Powder Co.(6).

TABLE III
DETERMINATION OF OPTIMUM CONCENTRATION OF DETERGENT (1 PART POLYOXYETHYLENE THIOETHER, 1 PART ALKYL PHENOL POLYOXYETHYLENE CONDENSATE) AND SODIUM CHLORIDE

No.	*Detergent conc. (%)*	*NaCl conc. (%)*	*Efficiency (% removal)*
1	0.05	0.1	48
2	0.05	0.2	61
3	0.05	0.4	87
4	0.1	0.1	55
5	0.1	0.2	64
6	0.1	0.4	85
7	0.2	0.1	69
8	0.2	0.2	73
9	0.2	0.4	82

TABLE IV
EFFICIENCY OF THE SELECTED DETERGENT (.025% POLYOXYETHYLENE THIOETHER, .025% ALKYL PHENOL POLYOXYETHYLENE CONDENSATE) IN REMOVING MINERAL OIL SOIL AS A FUNCTION OF pH (ADJUSTED WITH ACETIC ACID OR SODIUM CARBONATE)

No.	*Approx. % CH_3COOH**	*Approx. % Na_2CO_3**	*% NaCl**	*Initial pH*	*Final pH*	*Appearance of spent bath*	*Efficiency (% removal)*
1	8		4	2.75	3.95	hazy-clear	22
2	4		4	3.0	4.3	cloudy	25
3	2		4	3.3	4.95	cloudy	21
4	1		4	3.75	5.85	cloudy-turbid	42
5	0.5		4	4.9	6.5	cloudy-turbid	62
6	0		4	7.5	7.4	cloudy-turbid	87
7		1		9.9	9.2	turbid	51
8		2		10.1	9.55	turbid	54
9		4		10.1	9.7	turbid	46

* Expressed on the cloth weight.

TABLE V
REMOVAL OF A KNOWN MINERAL OIL BLEND BY OUTSTANDING DETERGENTS

No.	Detergent	Conc. (%)	Builder	Conc. (%)	Efficiency (% removal)
1	Alkyl phenol polyoxyethylene cond. + Polyoxyethylene thioether	.025 + .025	NaCl	0.4	87
2	Diethanolamine coconut fatty acid condensate	.05	Na_2CO_3	0.2	58

mono-oleate** was developed. The function of the mono-oleate is to stabilize the trioleate in mineral oil solution; this blend gives a stable, fine particle size, oil-in-water emulsion.

The oil was applied to woolen cloth in emulsion form (60 grams per liter), and passed through a wringer adjusted to leave approximately 100 percent moisture on the cloth weight. Mean oil pick-up was thus approximately 6 percent.

Detergency experiments with the combination of alkyl phenol polyoxyethylene condensate and polyoxyethylene thioether in the neutral salt solution, and the coconut fatty acid-amine condensate in alkaline solution, gave the data listed in Table V.

The degrees of scourability of the known mineral oil type and the proprietary product thus seem to be approximately equal. From this experiment and others not discussed, it seems quite likely that good self-emulsifying mineral oil types in general should be adequately removed when scoured with the selected neutral detergent combination.

Some idea of the effectiveness of a good emulsifier in a mineral oil blend may be gained from Table VI.

** Tween 81 (*6*).

TABLE VI
THE EFFECT OF AN EMULSIFIER UPON THE DEGREE OF REMOVAL OF MINERAL OIL FROM WOOLEN CLOTH

Detergent	Money-value conc. (%)	Builder	Conc (%)	5.91%* emulsifiable mineral oil	5.85%** mineral oil only
Alkyl phenol polyoxyethylene condensate	.17	NH_4Cl	0.2	59	33
		NaCl	0.22	58	34
		Na_2SO_4	0.27	61	27
		Na_2CO_3	0.2	49	23
Alkyl phenol polyoxyethylene condensate + Polyoxyethylene thioether	.085 + .1	NH_4Cl	0.2	70	20
		NaCl	0.22	70	18
		Na_2SO_4	0.27	68	15
		Na_2CO_3	0.2	52	18
Diethanolamine-coconut fatty acid condensate	.15	NH_4CL	0.2	32	67
		NaCl	0.22	44	45
		Na_2SO_4	0.27	52	41
		Na_2CO_3	0.2	64	16

* Applied from a water emulsion containing 60 g. per l. of oil.
** Applied from a petroleum ether solution containing 35g. per l. of oil.

LIMITED MILL TRIALS

Preliminary mill trials with a lightly fulled 8 ounce fabric have not revealed any unforeseen difficulties, with the one exception that the low viscosity of the detergent solution is somewhat troublesome. One ounce per gallon of detergent and 5 ounces per gallon of sodium chloride seem to be about optimum for this light-weight fabric. The detergent solution is readily prepared in a few minutes without heat, scours well at room temperature, or lower, and leaves stock-dyed plaids with clearer whites than does the normal soap and soda ash scouring. It is suspected that with heavier fabrics requiring fulling periods in excess of 1 hour the lubrication will be insufficient to prevent fulling mill wrinkles and chafe marks; however this difficulty has yet to be demonstrated. Considering the scouring cost saving of approximately one-third to one-half (disregarding steam cost), and the possibilities of improvement in quality, the desirability of further mill trials should not be ignored.

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1. K. LaFleur, "Am. Dyestuff Reptr." *38*, 9 (1949).
2. R. Aiken, "Ibid." *33*, 18 (1944).
3. W. Kritchevsky, U. S. P. Re 21,530, asst. to Ninol Inc. (1940).
4. Monsanto Chemical Co. Bulletin T-18 (1949).
5. H. Borghetty, "Am. Dyestuff Reptr." *36*, 23 (1947).
6. Atlas Powder Co. 'Atlas Surface Active Agents' (1948).

• PATENT DIGEST •

DYEING NYLON, VINYON or ACETATE with Mordant Dyes—Iron Carbonyl preparation C 4, 07

Brit. P. 631,765
(General Aniline & Film Co.—Grimmel—Nov. 9, 1949)

PAUL WENGRAF

Hydrophobic fibers (e.g., nylon, Vinyon or acetate of cellulose) cannot satisfactorily be dyed with mordant dyes, even by penetrating the material with the dye solution and aftertreating with the aqueous mordant. It has been discovered that the carbonyl compounds of iron or other metals of the iron group give good results in mordant dyeing. The carbonyl compounds are dispersed in water by using one of the known emulsifying agents such as Emulphor or Nekal; the skeins are agitated in this liquid for some time and then immersed in a mordant dye solution. Dyes of the anthraquinone class containing nitro groups and solubilized by phosphoric or acetic acid radicles are preferred. A large series of dyestuffs fit for this process are enumerated. Examples cite Alizarine Yellow G or R (C.I. 37 or 41), Metachrome Brown B (C.I. 101), triphenylmethane colors (for instance, Chrome Green (C.I. 674). Erio Chrome Azurol (C.I. 720), typical Alizarine dyes such as Alizarine V (C.I. 1027), and so on. The examples, however, call principally for nitroso compounds of acetophenone or naphthols. According to one of these examples, 5 gm. iron carbonyl is emulsified with a few drops of Emulphor AS in 300 gm. water; a skein of cellulose acetate is introduced in this dispersion and impregnated for 30 min. at 60° C., then aftertreated with some hydrosulfite. The prepared skeins are then dyed in nitrosocyanoacetophenone, solubilized with trisodium phosphate, and later slightly acidified with an organic acid (acetic or lactic). A deep blue shade of good fastness is obtained.

Reference:

Iron Carbonyl, $Fe(CO)_5$ or $Fe(CO)_4$ can be obtained by leading CO over iron at high temperatures. Apparently this complex compound has not yet been proposed for mordant dyeing purposes. A detailed

survey on industrial applications of iron carbonyl has been offered by Harrington in *Journal Science Iowa State College* 1942, 74. Frequently this product, prepared according to Brit. P. 438,893 of Dow Chem. Co. (see also *J. Soc. Chem. Ind.* 1930 271 T, 283, 287—Mond) or according to U.S.P. 1,901,656 (1933—I.G.), has been proposed as a pesticide when reacted with halogen, —CN or —CNS (Ger. P. 512,223, I.G.). Frequently it has also been proposed as an antiknock agent (U. S. Pat. 2,409,167 of Texaco Devel. Co.), under the tradename "Motyl." According to P. Ehrmann in *Revue de Chimie Industrielle* 1935, *44*, the product has strong reducing properties which make it suitable for reducing dyes to form leuco compounds, etc.

A parallel Can. P. has been issued under No. 452,669.

PRINTING THICKENER—Colloidal Clay (Bentonite) Exclusively Used. D, 1

Brit. P. 631,907
(United Turkey Red Company—Hampson—Nov. 11, 1949

Thickening pastes, typical for printing textiles, generally contain starch, British gum, tragacanth and the like. In contrast, this specification refers to thickening agents composed of colloidal clay (Bentonite) and pasted up with water, with or without applying heat. The colloidal clay constitutes about 20 per cent of the paste and generally not less than 10 per cent. The principal advantage in using clays instead of the standard organic thickeners can be seen in that the residues of this substance are more easily removed in rinsing, leaving no film behind. Flocculation of the clay is inhibited by dispersing it in alkaline media, especially where acid colors are used. An example cites the addition of Rongalite (11.4 per cent), potash (13.75 per cent) and caustic soda (0.8 per cent) to obtain this deflocculating effect. This method will also be appropriate for printing vat dyestuffs. Other examples are also offered for printing Rapidogens, Indigosols, acid and direct dyes on rayon (the last-named requiring pastes containing urea as additional fixing agents). As an example, a printing paste for viscose is composed of Xylene Cyanol FF (an acid dye of Sandoz), water, urea and Bentonite thickener.

References:

French Pat. 804,988 (I.G.) recommends printing a ureaformaldehyde thickener with China Clay for delustered ("damask") prints.

French Pat. 812,944 (Marion-Berand) proposes using Bentonite or Silvinite as thickeners for various printing pastes. The proportion is 120 gms. Bentonite in 860 gms. water while smaller amounts of gum thickener (20 gms.) have to be added.

Wool felt hats have often been decorated by printing clay thickened dyes on one side of the body (see *Teintex* 1937, *748*). The principal advantage is that the clay is easily removed in a rinsing process thus preventing staining of the nonprinted ground after steaming.

"ONIUM" COMPOUNDS of Various Dyestuffs Groups for New Printing Effects. D, 1

Brit. P. 633,160
(Imperial Chemical Industries—Chadderton, Thornton—Dec. 12, 1949)

A new class of dyestuffs carrying quaternary ammonium-, ternary sulfonium- or isothiouronium groups has been described in Brit. Pats. 482,184; 576,234; 576,270; 587,636 and 613,980 by Imperial Chemical Industries. They are characterized by the combination of the original dyestuff, through oxygen or a methylene linkage, with the groups' salt forming radicle. By an aftertreatment of this dyestuff complex with a saponifying agent, the original dye is regenerated in a somewhat analogous way to the application of "Neocotone" dyes. According to the present invention, it has been discovered that colored patterns on textiles can easily be obtained by locally applying one of these dyestuffs to textile goods, using one of the standard printing methods. A preferred method consists of mixing the pasted dyestuff with a weak acid, an alkaline salt or a weak acid (e.g.—acetic, citric or lactic acids or sodium salts thereof) the acid character of which is changed by steaming to a weakly alkaline state. The principal advantage in applying these complex dyes is that dyestuffs of high fastness (e.g., vat or azoic colors) can be used in a much simpler way than before. Blue and green shades are preferably produced by transforming *phthalocyanines* (which are generally printed on textiles by emulsion—pigment printing methods) into "onium" compounds. Obviously many interesting combinations are possible in using these dyes. They may be printed alongside dyes of other groups and resisted by mechanical means or by preprinting reducing agents or thiocyannates which decompose the complex. According to an example, a dyestuff obtained by reacting coppertrichloromethylphthalocyanine with tetramethyl thiourea is dissolved in acetic acid + water and dispersed in tragacanth thickener; finally sodium acetate is added. The prints are developed by aging for 5 minutes at 100° C., rinsed and soaped at the boil. Other examples call for reaction products of vats, insoluble azocolors and acetate dyes which are transformed into "onium" compounds by condensing them with pyridine or tetramethylthiourea.

Brit. P. 633,602
(Imperial Chemical Industries—Butterworth, Vickers—Dec. 19, 1949)

The onium compounds mentioned above, particularly those containing the isothiouronium group are used in an analogous way for dyeing purposes. An acetic acid solution of the same complex, containing an isothiouronium group as described in the foregoing example, is introduced in a dyeing liquid wherein cotton is dyed at 90° C. for 15 min., with the addition of some sodium acetate. Following rinsing, treating with boiling sodium carbonate and soaping, a plain dark blue fabric results.

DYEING NYLON Using Dilute Acid Dye Solutions. C, 4, 07

U. S. Pat. 2,499,787
(Du Pont—Sharkey—March 7,1950)

Nylon dyeings produced with acid dyes very often lack uniformity. Uneven stretching in spinning and processing of the filaments or the use of different lots in the same fabric may cause streakiness and variations in the depth of shade. A solution to this problem has now been found through the application of extremely dilute solutions of acid dyes. The concentration of the dyestuff solution is so low that the nylon absorbs practically all the dye (which is added in little portions) at once, leaving the dyebath visually uncolored. The fabric is placed in a 5 per cent aqueous solution of acetic acid. By adding the dye gradually while vigorously agitating at such a rate that the coloring matter is immediately absorbed, a completely uniform dyeing effect can be obtained even in cases where the fabrics consist of differently drawn filaments (difference up to 4 per cent). Another method calls for first dyeing a piece of wool with a typical acid dye (e.g., Du Pont Anthraquinone Green G, Rowe C.I. No. 1076), drying and treating this material together with uncolored nylon in an acetic acid bath in presence of sodium sulfate. After agitation of both specimens for an hour in the same bath, the dyestuff is observed to migrate from wool to nylon, giving equally good results. The first mentioned method is illustrated by another example. Uncolored nylon is immersed in very dilute acetic acid and a mixture of different acid dyes is added dropwise. A competely uniform shade is obtained on yarns of different provenience although the same goods show definite streakiness under normal working conditions. This method seems to take more time than that using a predyed wool substratum. Besides wool, other substances which temporarily adsorb acid dyes (e.g., basic ion exchange resins) can well be

used. Another way to gradually liberate small amounts of dyestuffs is to prepare compressed pellets of the dyes which dissolve slowly in the dyeing liquid.

References cited by the Patent Office among others:

U. S. Pat 2,332,817 (1943—Du Pont): a finishing process with colloidal wax dispersions or the like. A positively charged dispersion having a high affinity for textiles is distributed in water and a relatively small amount of a cation active agent (e. g., stearyltrimethylammoniumbromide) is added to retard and regulate adsorption.

U. S. Pat. 2,220,129 (1940—Du Pont): heating of the goods (especially irregularly dyed stockings) with dispersing agents (e. g., higher alkylsulfates) at 180-200°F. to level out acetate dyeings on nylons.

U. S. Pat. 2,179,371 (Monsanto Chemical Co.): condensing of naphthalene sulfonic acid with formaldehyde. Products of the "Tamol" group, are used as dye leveling (i.e., retarding agents) in wool dyeing.

U. S. Pat. 2,031,046 (1936—Ciba): addition of a condensate of a naphthalene sulfonate with aldehydes or alcohols to prevent the bleeding of wool dyes on undyed portions of threads or in milling operations.

Reference might further be made to U. S. Pat. 2,459,831 (Du Pont-McGrew, Sharkey) recommending the use sparingly of soluble salts of acid dyes, dissociating at a low rate in the dyebath and thus making very small amounts of dye available every time. (See REPORTER 1949, 402).

SETTING NYLON or Similar Fabrics—Treatment with Hot Gases. F, 4, 02

U. S. Pat. 2,499,141
(Fair Lawn Finishing Co.—Helmus—Feb. 28, 1950)

Nylon fabrics require a "setting" treatment at temperatures above 190° C. and about 20-25° C. below the fusion point of the filaments to obtain the necessary drape and resilience. This setting process is generally carried out within a short time, not exceeding 60 sec., either by passing between heated rollers or by moving the goods along a stationary surface (or sometimes by pressing unto them a heated sleeve or shoe). This specification states that hitherto proposed processes did not give uniform results; moreover, they require special skill in the setting operation. According to the present patent the fabrics are led at a speed of 36-144 yards per min. through a closed chamber while a current of gas (mostly air), heated to 400-450° F., is directed transversely to the traveling fabric. Each portion of the material is exposed for 1-10 seconds only to this high temperature and immediately cooled thereafter. The fabrics—see Fig. 2—rolled up on shaft (33) are led into the closed housing (3) and wound up on roll (1) and, from here, on roll (2). Burners 24) and (24a) are mounted on (3); the heated air is driven by fan (15) into an inner chamber (4) and distributed by baffles (9), (9a), (10) and (10a) into different ducts (5) and (5a), partly penetrating through nozzles (7) and (7a) also through (8) and (8a) into the space formed by wall (6). Another portion of the heated air is forced through ducts (12) and (12a)—see Fig. 1—into the inner part of rolls (1) and (2), passing a system of cones (51a, b, c), and reflected by the inner wall (50) to flow back to the open space (75) of housing (3). Combustion gases, temporarily accumulated in this operation, are drawn off through opening (27). After a very short exposure to the hot gases the fabric leaves chamber (3) and is cooled off on roll (32)—Fig. 2—and finally rolled up on (36). The main advantage of this device is a uniform short treatment of the fabric's surfaces. It is emphasized that the apparatus works speedily and is less subject to the operator's control. Although the process is principally intended for treating nylon it can be applied to acetate of cellulose provided the temperature is lowered to 300-360° F. A pleasant chintz-like effect is said to be obtained.

References cited by the Patent Office, among others:

U. S. Pat. 2,349,558 (1944—Offen): a drying hood containing circularly arranged nozzles for blowing hot air on webs; used particularly for drying freshly inked paper.

U. S. Pat. 2,268,988 (1942)—Interchemical Corp.): a special apparatus for drying ink; contains an inflammable, volatizable solvent on a drum heated below 100° C.; completely removes the solvent in a hot air zone.

U. S. Pat. 2,065,032 (1936—Spooner): a drying calender, used especially for paper manufacture; consists of a hollow cylinder, the paper running over the surface of the cylinder which is heated from inside by two sets of nozzles directing the hot gases toward each other.

U. S. Pat. 2,060,430 (1936—Spooner): a textile material such as cloth or warp is conveyed along a given path while being subjected to the action of steam or hot air streaming with high velocity through nozzles inclined to the direction of the web and aligned in two opposite sets. (See the patent mentioned above).

FLAMEPROOFING—Polyethylene Imine Composition G, 2, 03

Brit. P. 633,441
(Imperial Chemical Industries—McLean, Marrian—Dec. 1949)

Polyethylene imine, combined with other organic compounds (Ca- phytate), with pentaerythritol tetraorthophosphate (Brit. P. 596,306) or with acidic phosphoric esters of dipentaerythritol (Brit. P. 604,490), has previously been recommended as a flameproofing agent. The present specification states that these methods caused stiffening of the fabrics. It has been found that stiffness can be avoided without imparting the flameproofing effect by combining finishes of this

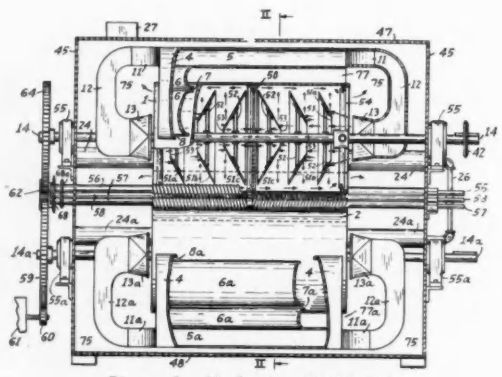


Figure 1—U. S. Pat. 2,499,141

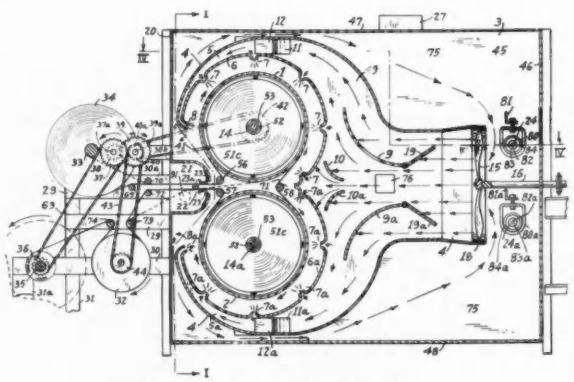


Figure 2—U. S. Pat. 2,499,141

type with quaternary ammounium compounds containing at least one long fatty chain linked to the N-atom. The other components are polyethylene imine and an acid ester of inositol, penta- or polypentaerythritol wherein all hydroxy groups are esterified with o-phosphoric acid. The quaternary compound neutralizes part of the acid groups. Preferably the cloth is first treated with an aqueous alcoholic solution (10 per cent) of polyethylene imine under reflux and baked in steam over night. It is then soaked in cetyl trimethylammonium hydroxide and finally steeped in an aqueous solution of pentaerythritoltetraorthophosphate and dried. These fabrics were durably flameproof and soft in contrast to the harsh handle which results in finishes where the quaternary ammonium compounds had been omitted.

Reference:

Polyethylene imine has formerly been used for animalizing rayon (Brit. P. 460,596 or U. S. Pat. 2,231,890-91). Former U. S. Patents of Imperial Chemical Industries protecting the use of polyethylene imine combined with pentaerythritol phosphatefi are 2,470,042 and 2,472,335.

DECATING MACHINE G, 3

U. S. Pat. 2, 498,416
(Parks & Woolson Machine Co.—Hadley—
Feb. 21, 1950)

This patent protects a machine which treats fabrics of various lengths or widths in a decating process under equal circumferential pressure at all points. The fixation of woven goods is effected in such a way that the steaming and cooling-off phase is carried out without handling, unwrapping or rewinding the fabrics which are rolled up on a perforated pipe (14). The main feature of the invention

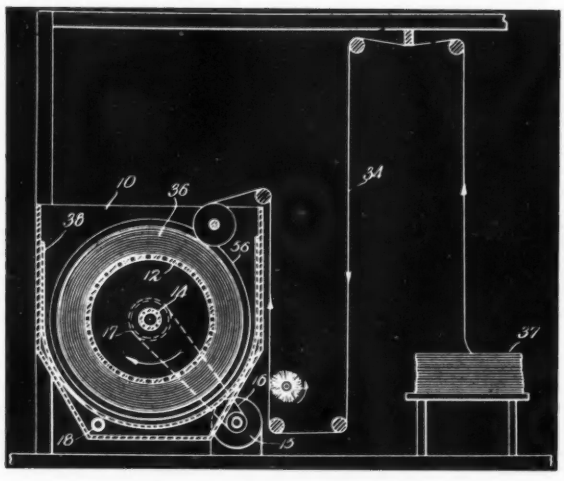


Figure 1—U. S. Pat. 2,498,416

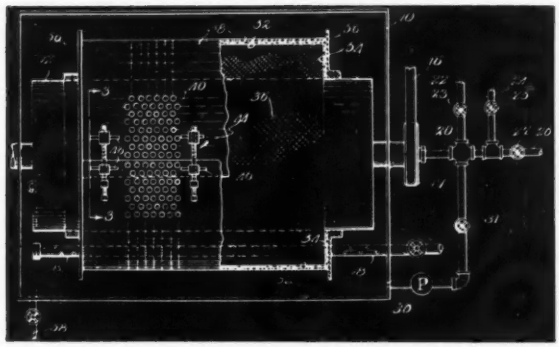


Figure 2—U. S. Pat. 2,498,416

is the jacket (38), consisting of a single perforated, flexible, heat resistant sheet or an appropriate plastic, shown in open state in Fig. 1, when the fabric is first wound around the foraminous cylinder (12). Thereafter, jacket (38) is wound around the fabric in roller form and tightly clamped—see Fig. 2—by the clamping unit shown in detail in Fig. 3.

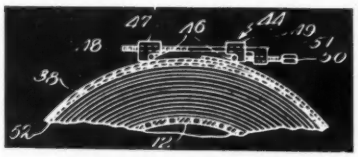


Figure 3—U. S. Pat. 2,498,416

This clamp (48) operates with the rod stock (46). The decating operation is carried out by closing the cylinder sidewise with plates (56), heating the water by a steam pipe (18) to the boil and driving the hot liquid radially in both directions by pump (P). After this the hot water is drawn off (drain 58) and cold water is circulated in both directions through the fabric roll. It is essential that the single layers are firmly held in the same position throughout the entire operation as long as the fibers are in a plastic or semiplastic condition, thus preventing any mechanical change of the fiber's structure or distortion during this period.

References cited by the Patent Office, among others:

U. S. Pat. 1,825,974 (1941—Obermaier); dyeing machines for textile fibers (combing laps) or cakes are arranged one above the other around a perforated pipe. These hold under pressure during the dyeing and washing process.

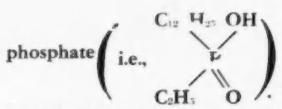
U. S. Pat. 1,841,024 (1932—Eclipse Textile Device): a dyeing apparatus for dyeing conical packages placed in a dyeing tank. The dyebath is forced through the openings in the cone, which is held in fixed position by clamps.

U. S. Pat. 1,266,110 (1918—Dudley): a dyeing machine comprising a foraminous cylinder and a fabric wound around this cylnder and fixed with annular members on both sides of the cylinder. The dye liquid is forced (as in many other dyeing apparatus) from a center pipe in radial direction through the goods.

STATIC ELECTRICITY PREVENTION— Dialkylphosphates. G, 1

U. S. Pat. 2,498,408
(General Aniline & Film Corp.—Fox—
Feb. 21, 1950)

Static electricity is formed on fiber surfaces in many treatments such as spinning, carding, combing and drying. The present invention refers particularly to acetate of cellulose filaments and to fabrics composed thereof. The accumulation of electricity is a serious problem because of the low moisture content of these fibers compared with natural fibers. It has been discovered that the drawback mentioned above can completely be avoided by treating the fibers with laurylethyl-acid-o-

phosphate  i.e., . This agent is preferably applied from a wick or roller in conjunction with a lubricating oil at a ratio of 1-10 per cent organic phosphate to 9-90 per cent lubricant (for instance, blown or unblown vegetable oils optionally blended with mineral oils). Similar organic phosphates such as hexyl- or stearylethyl acid phosphates were found to have the same effect.

References cited by the Patent Office, among others:

U. S. Pat. 2,345,734 (1944—Eastman Kodak): treatment of oils, such as Castor oil, or waxes with a phosphating agent (any phosphorus containing acid). Self-emulsifying lubricating agents are obtained as surface active agents, suitable as deelectrifying or antistatic agents.

U. S. Pat. 2,080,299 (1937—Du Pont): mono-, di- or trialkylesters of phosphorus containing acids are proposed as corrosion inhibitors.

U. S. Pat. 2,005,619 (1935—Du Pont): mixed acid or neutral phosphoric or phosphorus acid alkyl esters can be used as plasticizers and flame retardants.

Reference is further made to U. S. Pats. 2,279,501/2 and 2,318,296 (Eastman Kodak)—quoted in REPORTER 1946, 503 (Brit. P. 576,365): organic phosphorus containing compounds are recommended as antistatics.

ABSTRACTS

The Structure of Textile Fibers. VIII. The Long Vegetable Fibers (1) Bast Fibers: Jute, Hemp, Ramie, Sunn Hemp. (2) Leaf Fibers: Sisal, Manila Hemp (Abaca), Phormium.

A. J. Turner, J. Textile Institute *40*, P972-84, October, 1949.

The long vegetable fibers, unlike cotton, are not homogeneous but comprise a medley of substances in varying amounts. Cellulose, it is true, is the main constituent of all, and when purified is found to behave chemically like the cellulose from cotton. But the other substances that are present have an important influence on the chemical and physical properties of the various fibers. Flax has been described in a previous article.

A table of the chemical composition of the various bast and leaf fibers shows a cellulose content ranging from 68 per cent in ramie to 45 per cent in phormium. The remainder is composed of hemicellulose (averaging 15 per cent), pectin, lignin, water-soluble material, fat and wax, and moisture.

Jute plants are retted in water for twelve days and the fiber then stripped from the stems by hand. Ramie and sunn hemp are similarly treated.

The extraction of the leaf fibers presents a rather different problem because they are embedded in a fleshy tissue covered by a thick tough skin. A combined crushing and beating action is used to remove the skin and the fleshy tissue. Machines known as decorticators are used for this work. At the same time the material is well flushed with water.

A description of each of the above fibers follows, including the plant from which it is derived and its particular physical properties; also a number of cross-sections and x-ray diagrams are included.—W.H.C.

Synthetic Detergents in the Textile Industry

F. D. Snell, Rayon and Synthetic Textiles *30*, No. 11, 81-2; No. 12, 90-1 (1949).

As ordinarily manufactured, synthetic detergents are themselves neutral, whether anion-active, cation-active, or nonionic. The most common types in large-scale production resemble soaps in being anion-active. Most synthetic detergents are more soluble than soap, and due to lack of hydrolysis they are more freely rinsed.

All surface-active agents, including soap, combine polar and nonpolar groups in the molecule; this is about all the many types have in common. The relative balance between the two opposites—polar and nonpolar groups—determines the degree of surface activity of the compound. As the chain length of the nonpolar or hydrocarbon radical is increased, the solubility of the compound in water is decreased. A relatively high molecular-weight nonpolar portion is desirable for agents to be used as detergents, while a relatively low molecular-weight nonpolar portion usually gives greater effectiveness as a wetting agent.

Lathering properties are related to solubility and to surface orientation. If an agent is too soluble or too insoluble it will not produce a copious lather. As a rule, the detergent types of surface-active agents have been found to be better foam-producers than the strictly wetting-agent types of products.

For discussion purposes the principal classes of synthetic detergents have been limited to seven. These seven classes are illustrated with trade names of typical products of each class in an accompanying table. The particular properties and uses of each of the seven classes are described in detail: 1. Alkyl aryl sulfonates; 2. Alkyl sulfonates; 3. Alkyl sulfates; 4. Sulfated monoglycerides; 5. Sulfated and sulfonated amides; 6. Nonionic agents; 7. Cation-active agents.—W.H.C.

Chemical Aspects of the Finishing of Fibers and Fabrics

H. C. Borghetty, Rayon and Synthetic Textiles *30*, No. 11, 79-80 (1949); *31*, No. 1, 85-7; No. 2, 81-2; No. 3, 85-6; No. 4, 81-2 (1950).

This is a review of many of the modern processes for finishing textile fabrics, viewed particularly from the chemical standpoint. The full text should be read, as an abstract can do little more than list some of the subjects discussed.

On reacting mercerized cotton with stearamido methyl pyridinium chloride, it becomes water-repellent. By reacting with phosphoric acid and urea, it yields a phosphate ester which is flameproof and resists washing. The synthetic resins urea- and melamine-formaldehyde give it crease resistance and permanent glaze. Other resins serve as binders for pigments, laminating agents, and to improve wear and abrasion resistance. Rayon treated with glyoxal has improved dimensional stability.

The animalization of cellulose fibers, to give them affinity for acid dyes, is discussed. Rayolanda WS is an example of a fully-animalized viscose fiber obtained by addition to the spinning solution of synthetic resins derived from cyanamide.

The mothproofing of wool is accomplished either by the use of moth repellents based on fluorides or silicofluorides; by means of quaternary ammonium compounds; or by the use of certain colorless acid dyes. A more fundamental approach to the problem is the Harris treatment, based on an alteration of the chemical structure of the wool.

Shrinkage control of wool by various devices is also discussed.—W.H.C.

Proceedings of the

American Association of Textile Chemists and Colorists

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JUNE 12, 1950

Report of New York Section Meeting

THE annual business meeting of the New York Section was held on Friday evening, May 5th, at the Swiss Chalet, Rochelle Park, New Jersey. The Treasurer, John H. Hennessey, reported a balance of $1740.59 as compared to $1483.09 for the previous year. A letter from the Chairman of the Membership Committee, Clark A. Heydon, indicated that all members of the Section who had been delinquent in their dues had been contacted. Henry L. Young, Chairman of the Corporate Membership Committee, reported that the number of corporate members in the New York Section remained about the same as the previous year and that emphasis in the future would be placed on obtaining the support of mills and others connected with the textile field rather than on suppliers. Kenneth A. Howry, Chairman of the Publicity Committee, stated that all meetings of the Section had been publicized beforehand and reported adequately. Dr. Eugene W. K. Schwarz, Chairman of the Research Advisory Committee, reported that two area committees had been active. He also reported that to prepare adequately papers for the Intersectional Contest it was necessary to have two committees working simultaneously—one preparing the paper for the current year and the other working on the paper for the following year. Robert W. Brewer, Chairman of the Outing Committee, stated that plans had been completed for the annual outing and golf tournament to be held at the North Jersey Country Club on June 16th.

The Chairman, Charles W. Dorn, discussed the proposed changes to the National Constitution and most of those present agreed with the changes.

Kenneth H. Barnard, Chairman of the National Convention Committee, discussed plans for future conventions and polled the members on their preferences for location, type of program, private entertainment, banquets, and time of week.

Patrick J. Kennedy, Chairman of the Nominating Committee, presented the following slate of officers for the 1950-51 season who were subsequently unanimously elected:

Chairman—Paul J. Luck
Vice-Chairman—Weldon G. Helmus
Secretary—Norman A. Johnson
Treasurer—James J. Marshall
Sectional Committee—Charles W. Dorn, Dr. Herman E. Hager, George L. Baxter and Patrick J. Kennedy.

Dr. P. U. Nivrac was unable to be present to address the meeting but an able substitute gave an illustrated lecture on the life and times of Charlie Dorn which was greatly enjoyed.

The Chairman announced that the Section would pay a prize of $25.00 for the best slogan submitted for the 1951 Convention. Suggestions should be sent to the Secretary of the Section.

The attendance was about 200.

Respectfully submitted
NORMAN A. JOHNSON,
Secretary

NCSC Student Chapter Report

THE final meeting of the season of the North Carolina State College Student Chapter was held at 7:30 p.m. on May 4.

New officers for the coming year were elected as follows:

Chairman—Robert E. Crowell
Secretary—Charles F. Donyes
Treasurer—Edwin B. Armstrong
Social Chairman—John L. Rusher

The principal speaker of the evening was Robert A. Gillim, graduate of the Textile School at State College and now Vice President of Dyeing and Finishing with Burlington Mills. Mr. Gillim talked on the problems that he had encountered with synthetic fibers, as they first came on the market, and how these problems were solved. He also mentioned the vast amount of work being done on the newer synthetics such as Fiber V and Orlon.

At the conclusion of his talk a film entitled "The Fabric of Our Lives" was shown, depicting the flow of goods through the various steps of production at Burlington Mills.

Respectfully submitted,
E. H. ASPINWALL, Jr., *Secretary*

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

50-13

Education: To receive B.S. in Textiles from Bradford Durfee Technical Institute in June, 1950.

Experience: Four summers in dyeing and finishing plants.

Age 26; veteran; married; references; New England or Mid-west preferred.

5-29, 6-12

50-14

Education: B.S., Lowell Textile Institute; M.A., Clark University; expecting Ph.D. in physical chemistry from Clark University, June, 1950.

Experience: chemist in textile laboratory; teaching and research assistant, Clark University.

Age 25; unmarried; references; research or development work preferred, location not essential.

6-12, 6-26

50-15

Education: B.S., Lowell Textile Institute; M.A., Clark University; expecting Ph.D. in organic chemistry from Clark University, June, 1950.

Experience: textile chemist; laboratory assistant and teacher, Clark University.

Age 25; unmarried; references; research or development work, east of Mississippi, preferred.

6-12, 6-26

50-16

Education: One year, Philadelphia Textile Institute, Textile Chemistry & Dyeing.

Experience: Two summers as salesman.

Age 19; unmarried; references; position as textile salesman desired.

6-12, 6-26

"ADVANCEMENT, ACHIEVEMENT, THROUGH CONTINUED COOPERATION"

29TH ANNUAL A.A.T.C.C. CONVENTION 1950

Wentworth-By-The-Sea, Portsmouth, New Hampshire
September 28-29-30
Sponsored by the Rhode Island Section

THIS is a preliminary program and information sheet for the 1950 Convention, to be held on September 28, 29, and 30, in Portsmouth, New Hampshire, with headquarters at the Wentworth-By-The-Sea. The final announcement, including detailed information on the program, transportation schedules, hotel rates, and registration envelope, will be mailed August 1, 1950. The official program will be distributed at the Registration Desk of the Convention, and will also be announced in the *American Dyestuff Reporter.*

HISTORIC NEW ENGLAND

Historic New England awaits to welcome you with its true down East hospitality. Winter, Spring and Summer beckon folks to the beautiful New England countryside for skiing, hiking and vacations; but Fall in New England is beautiful beyond description. In this wholesome and enjoyable climate, the roads, winding over brooks and pure mountain streams, past fields marked off with stone walls, and through variegated forests brightened by the colorful over-hanging maples and towering pines, make an ever-changing picture which you will long remember. Mountain and seashore alike are a blaze of glory in this early fall season.

The battlegrounds of the Revolution, the homes of national heroes, poets and patriots are all a part of historic New England. Portsmouth and the surrounding countryside has its share of all this appeal, with its tours of old homes and famous gardens. The Navy Yard has been a vital factor in the growth of our Navy since early times and many famous ships can call it home.

All along New England's "stern and rock-bound coast" fishermen ply their trade, and their clambakes and lobsters are famous all over the country.

American Textiles had their start in New England—in fact, in the Rhode Island Section, where the Slater Mill has become a museum of the Textile Industry. New England has four excellent Textile Schools; three of them within the bounds of the Rhode Island Section. Many of the men and mills foremost in Textiles today owe their start to New England. Plan your vacation for late September or early October and visit three states rich in tradition, a vacationland of beauty calling you to share in its many pleasures. Whether you come by plane, private car or train, historic New England awaits you.

THE CONVENTION THEME

At this mid-century point we pause to look backward and forward. The last half-century witnessed the founding, and growth to maturity, of the A.A.T.C.C. It also saw a greater development in textile processing than any corresponding period. At the start of this century, most information about the various phases of finishing operations was a jealously guarded secret. Under such conditions little progress could be made. A thought shielded in one mind suffers from a lack of variety in viewpoint. The greater the number of lights focused upon a subject from various angles, the more the shadows disappear until there is complete illumination.

The old saying "two heads are better than one" always holds true. With the free exchange of ideas in our Association, with the untiring efforts of our members to acquire and disseminate knowledge, we have made a substantial contribution to the advancement and achievements of the last half-century. Of this we can all be proud. We cannot, however, just take pride in the past. The greatest value will come if it instills in us a feeling of confidence as we look forward. We face the new half-century firm in the belief that there will be Advancement, Achievement, Through Continued Cooperation.

GENERAL INFORMATION

The Reservation and Registration, Reception, Transportation, Entertainment, and Ladies Committees will have desks located in the main lobby at the Wentworth-By-The-Sea. Information regarding any of their functions can be obtained and arrangements made for special transportation. The Exhibits Committee will have a desk located in the Exhibition Building. In addition, a member of each Committee will be located at each hotel, with information available on the activities of the Convention.

Hotel reservations, including room assignments, will be made in advance so that each individual will know the hotel in which he is located. The Registration Desk will be located in the headquarters hotel, the Wentworth-By-The-Sea.

THE HOTELS WILL NOT ACCEPT ANY REQUESTS FOR RESERVATIONS. ALL REQUESTS MUST BE HANDLED BY THE RESERVATION COMMITTEE. NO ROOMS WILL BE ASSIGNED OR RESERVED WITHOUT AN ACCOMPANYING REGISTRATION. ROOMS WILL NOT BE AVAILABLE FOR ENTERTAINMENT PURPOSES. It is necessary that all rooms be assigned for occupancy. Sufficient bar and cocktail facilities are available in the various hotels. There will be frequent and regularly scheduled bus service between all hotels. These buses will be assigned to serve only those attending the Convention. There will be no charge for transportation.

The Office of Personnel Service will be available during the Convention at the Wentworth-By-The-Sea.

A special program will be arranged for the ladies. They are also invited to participate in any of the other activities of the Convention in which they are interested.

ACCOMMODATIONS

Accommodations are available for approximately 1400 individuals. In addition to the Wentworth-By-The-Sea (425), the following hotels are available: The Marshall House (350), the Emerson and Cottages (200), the Rockingham (150), the

Harrington (75), the Drake (50), and several small hotels in Portsmouth. Motels, cabins, and tourist homes are available for those in excess of 1400.

There are very few single rooms available. The rooms will require at least double occupancy. If possible, name the individual with whom you desire to share a room. If this information is not given, you may be asked to share a room with some other person who will be selected by the Reservation Committee. It is emphasized that no hotel will accept direct requests for reservations.

MEALS

Meals will be served during the Convention as follows:

Rockingham Hotel—All regular meals.

Wentworth-By-The-Sea — All regular meals except that on Thursday and Saturday evenings the banquets will require all available facilities.

Emerson Hotel—No meals served.

Marshall House—Breakfast and lunch served but no evening meal.

There will be two New England clambakes served during the Convention. One clambake is scheduled for noon on Friday, and the second at noon on Saturday.

Various public eating places where famous New England seafood and other meals are served are available as follows:

Folsom-Salter House—An early Colonial Home with excellent cuisine serving evening meals.

Warren Lobster House—A noted restaurant for lobster dinners on the picturesque banks of the Piscataqua River between Maine and New Hampshire.

Jarvis Restaurant—Excellent food reasonably priced. Excellent for a quick lunch or a sandwich. This restaurant will remain open until 3:00 a.m. on Thursday, Friday and Saturday night to accommodate late diners.

Snack Bar in the Exhibition Hall at Wentworth-By-The-Sea — Sandwiches, coffee, etc.

Snack Bar in the Wentworth-By-the-Sea —Sandwiches, coffee, ice cream, etc.

Cocktail Lounges — Wentworth-By-The-Sea (two), Rockingham and Marshall House.

PROGRAM

Thursday, September 28, 1950

Morning—Council Meeting

Afternoon—General Technical Meeting.

Evening—Corporate Membership and Olney Medal Banquet.

Evening—Ladies Banquet.

Friday, September 29, 1950

Morning—Group Meetings.

Noon—Clambake.

Afternoon—Intersectional Contest.

Evening—Entertainment at Wentworth-By-The-Sea.

Saturday, September 30, 1950

Morning—Group Meetings.

Noon—Clambake.

Afternoon—Trip to Navy Yard.

Evening—Annual Banquet.

TECHNICAL PROGRAM

GENERAL—

1. Waste Disposal
2. Government Trends in Consumer Labelling.
3. Economics of the Textile Industry

GROUP MEETINGS—

Woolen and Worsted

Cotton

Synthetics

Testing and Auxiliary Chemicals

The details on the technical program will be available with the final announcement mailed August 1, 1950.

LADIES PROGRAM

Members of the Ladies Committee will be available at the Registration Headquarters at the Wentworth-By-The-Sea to assist the ladies whenever possible. The ladies who register are invited to attend the dinners, luncheons, and technical sessions, in addition to the following special events that have been provided for their entertainment: Tea and Cocktail Party, Banquet including door prizes, visit to Mill and Salesroom—Goodall-Sanford Company, sightseeing trips around historic New England, fashion show—Bates Manufacturing Company, and recreation, including golf, putting, tennis, swimming, boating and fishing.

The ladies are invited to join the men at the clambakes, dinner and entertainment Friday evening, and the visit to the Navy Yard.

RECREATION AND SPECIAL ATTRACTIONS

At the Wentworth-By-The-Sea: Tennis, nine hole golf course, nine hole chipping and putting course, eighteen hole putting green, heated outdoor swimming pool, boating and fishing trips from the hotel pier.

Additional facilities for recreation and special attractions in the vicinity of the Convention Headquarters: Several excellent eighteen hole golf courses are available within a few miles. Historical sightseeing tours are plentiful for those who want to drive their own car. Fishing and boating trips may be organized.

EXHIBITS

The Rhode Island Section is sponsoring an exhibit to reflect the scientific and technological progress of the textile and allied industries. Exhibits will be sponsored by the educational institutions connected with the textile industry, also the progress of the various research groups of the A.A. T.C.C. will be displayed. The Exhibition Building is separate from the Wentworth-By-The-Sea. It is located about 100 feet from the hotel.

The Exhibit Committee will maintain a desk in the Exhibition Hall. The exhibits will be available for inspection as follows:

Thursday—1:00 p.m. to 9:00 p.m.

Friday—9:30 a.m. to 7:30 p.m. (lights will be on until 9:00 p.m.).

Saturday—9:30 a.m. to 3:00 p.m.

PUBLICITY

A separate room will be available at the Wentworth-By-The-Sea for the Publicity Committee and the Press. Telephone, telegraph, and stenographic service will be available.

TRANSPORTATION

Public highways in the vicinity of the Wentworth-By-The-Sea and the other hotels will be plainly marked for the benefit of those traveling by private automobile.

A special train is planned from New York City to Portsmouth, New Hampshire, Wednesday evening, September 27, leaving Penn Station at 10:30 P.M.; arriving in Portsmouth at 7:00 A.M. Thursday. This train should allow proper connections for those individuals traveling from the west or south. The return trip of this train will leave Portsmouth, N. H. 11:15 A.M. Sunday, arriving in New York City 7:45 P.M.

Charter plane service will be arranged if there is sufficient demand.

Frequent and regularly scheduled bus service will be available between all hotels. These buses will serve only those attending the Convention and there will be no charge to passengers.

IMPORTANT: TO ASSIST THE COMMITTEE IN PREPARING THE PLANS FOR THE CONVENTION, PLEASE RETURN INFORMATION CARDS IMMEDIATELY.

REGISTRATION AND HOTEL RESERVATIONS

The final announcement for the 29th Annual Convention, September 28-30, 1950, will be mailed August 1, 1950. The registration envelope should be returned promptly when received.

SOME ASPECTS OF CHLORINE RETENTION BY RESIN-TREATED FABRICS*

A. C. NUESSLE and J. J. BERNARD

Textile Applications Research Laboratory of the Rohm & Haas Co., Philadelphia, Pa.

Fabrics containing nitrogenous resins are known to pick up chlorine when subjected to hypochlorite bleaching baths. In a study of the effect of varied chlorination conditions on the quantity of chlorine retained and on the resultant discoloration and/or tensile loss during ironing, it was found that (a) small amounts of retained chlorine are harmless; (b) too high a bleach concentration or too great a bath ratio can cause the chlorine retention to reach a dangerous level; (c) the first injurious effect on melamines is yellowing during chlorination, while ureas are first to show tensile-strength loss on subsequent ironing; and (d) one type of nitrogenous resin shows appreciable resistance to both yellowing and tensile loss. Factors having a lesser influence on pickup or damage included resin concentration, time and temperature of chlorination, and time and temperature of rinsing, although further work is indicated on certain of these points. A brief comparison of methods of chlorine analysis was made.

INTRODUCTION

THE important position of viscose-rayon fabrics in the textile field is due in no small part to the substantial improvements in fabric properties brought about by treatment with synthetic resins, such as urea-formaldehyde and melamine-formaldehyde. These treatments impart the desirable properties of crease recovery, shrinkage resistance, and increased wet strength, without which the fabric would be unsuitable for many uses.

Along with these improvements, however, the treated fabric acquires an affinity for chlorine, and will retain it to a greater or lesser degree whenever the fabric is subjected to a hypochlorite bleach. This retained chlorine may manifest itself in two ways: the fabric may become yellowed (characteristic of melamine resins) and/or it may char and lose strength on subsequent ironing (the urea resins are the more susceptible to this, although the melamines are by no means immune). On the other hand, there are conditions under which adverse effects rarely occur. For example, if resin-treated fabrics are chlorinated by recommended laundry procedures *(1, 2)*, which generally agree on chlorination at 150° to 160°F. for 7 to 10 minutes, with 0.04 per cent of available chlorine on fabric (about 0.01 per cent on bath), followed by several hot rinsings, they rarely show yellowing, and there is no tensile loss on subsequent ironing at temperatures up to 400°F. Even under more severe conditions of chlorination, if the fabric is dried and pressed carefully at moderate temperatures, it is possible that no damage will occur, aside from a slight yellowing in the case of the melamines. Further, almost without regard to the severity of chlorination, no damage (either as yellowing or as tensile loss) due to retained chlorine is possible if an antichlor (a reducing agent such as sodium bisulfite) is added during the rinsing cycle.

With these facts in mind, a few textile finishers take the attitude that, in view of the many millions of yards of resin treated fabrics which have been produced—some of which must have been chlorinated during their service life — the incidence of damage is so low as to be negligible; and that, where it does occur, it is strictly the fault of the person who departs from approved laundry procedures.

On the other side of the fence are the finishers who will not process a white or light-colored washable fabric with any resin which retains enough chlorine to show a blue color with starch-potassium iodide reagent. And this test is, of course, so sensitive that all urea and melamine resins are ruled out, even when the mildest chlorination has been used.

It is not the purpose of the present investigators to resolve the controversy that may ensue between the laundry operator, who chlorinates a resin-treated garment, and the textile finisher, who applied the resin. Nor is it our intention to set up a laboratory test method for general use; this is more properly the function of the A.A.T.C.C. Chlorine-Retention Committee, of which the senior author is a member. Rather, the present study was intended as a general survey of the more obvious variables that may influence the amount of chlorine retained and the degree of damage resulting; and we are presenting our results with the hope that they will arouse interest in the problem and stimulate further investigation, particularly along the lines of correlation between accelerated laboratory tests and conditions of practical use.

EXPERIMENTAL

For our study we selected resins of the following types:

A. Urea-formaldehyde
B. Melamine-formaldehyde
C. Methylated melamine-formaldehyde
D. A modified urea-formaldehyde

Throughout most of the investigation these resins were employed at concentrations that previous laboratory and plant experience had indicated would give approximately equal stabilization and crease-proofing effects. In one phase of the study, however, equal concentrations of each were used.

The catalyst in each case was of the type and quantity recommended by the manufacturer of the resin. Catalysts included the following: for A and C, diammonium phosphate; for B, an organic amine hydrochloride; and for D, ammonium chloride.

The fabric was a spun-rayon challis, which had been boiled off and prepared for finishing. The resin solution was applied by padding, squeezing to 100 per cent wet pickup; the swatches were then framed to original dimensions, dried at 260°F., and cured for 10 minutes at 300°F. All samples were then washed for 15 minutes at 100°F. in 0.1 per cent soap according to Fed. Spec. CCC-T191A for rayon.

The fabrics were chlorinated by immersion in a beaker of hypochlorite solution at the appropriate temperature, chlorine concentration, and bath ratio with frequent stirring for the appropriate time.

* A special contribution of the Rohm & Haas Laboratories.

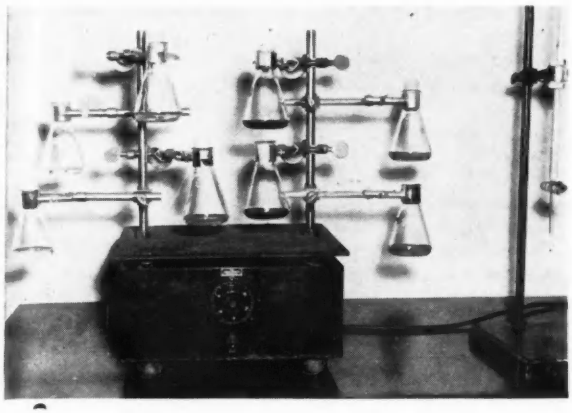

Figure 1
Shaking Apparatus

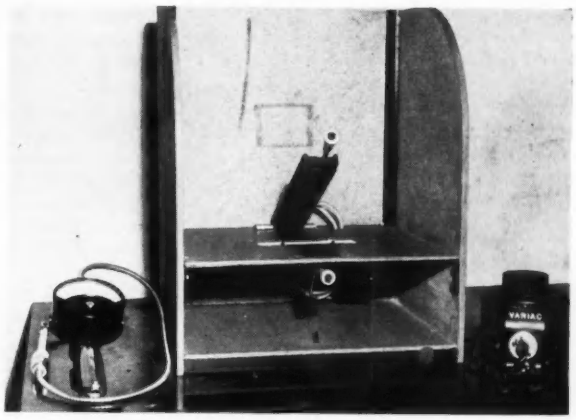

Figure 2
Electrically Heated Iron

All the samples in each series were chlorinated together in the same bath. Our source of hypochlorite was Clorox, which contains about 5.25 per cent NaOCl or 5.0 per cent of available chlorine. The samples were then given six 5-minute rinses in a wash wheel at 100°F., except where otherwise stated.

The treated fabrics were put through two tests: (a) analysis for retained chlorine, and (b) hot-iron test (see Fig. 2).

ANALYTICAL—(1) A disc of fabric with an area of 19.1 sq.-cm. was cut from the bleached, rinsed fabric. Any size of sample will do; we employed this size because such a die was handy, and because the cut disc would lie flat on the bottom of a 125-ml. Erlenmeyer flask. By using this method of sampling we could analyze the wet fabric; this was convenient, though not necessary, since comparative tests on the same fabric after careful drying at room temperature showed no appreciable loss of chlorine, even when there was a 16-hour delay before analysis. No allowance was made for shrinkage because none of the treated fabrics showed much dimensional change.

(2) One or more discs of fabric were placed in an Erlenmeyer flask, together with 5 ml. of glacial acetic acid, 5 ml. of distilled water and 3 ml. of potassium iodide (30 per cent, freshly prepared).

This method was based on a wartime analytical scheme for fabric containing certain chlorinated organic materials, and for the present purpose the acid concentration would seem to be excessive. Comparative study has indicated, however, that the extra acid will appreciably shorten the time of analysis, particularly where heavily chlorinated melamine resins are concerned. Some acid appears to be necessary, otherwise the solution tends to become alkaline and will yield low results; although other investigators, using a similar though not identical method *(3)*, have stated that no acid is required.

(3) The flask was stoppered and shaken for fifteen minutes. We employed a shaker table for this step (Fig. 1) so that a dozen or more analyses could be conducted simultaneously.

(4) The liberated iodine was titrated in the presence of the fabric with N/40 thiosulfate and with starch as indicator. An untreated fabric, chlorinated and rinsed with the rest, was analyzed as a control; this always gave a low but definite titration value, perhaps due in part to actual retained chlorine, but more likely to air oxidation of the reagent (KI) during the shaking. Usually, where melamine-resin treatments were involved, the titrated sample still showed a gradual liberation of iodine, and required an additional 15 minutes of shaking, followed by retitration. In hundreds of tests over the past three years we have found that urea resins liberate about 95 per cent of their retained chlorine in the fifteen-minute period, while melamines sometimes liberate only 80 to 85 per cent in the first fifteen minutes and a total of 90 to 95 per cent in the second 15 minutes, after they have been heavily chlorinated. In the present study two titrations were made where necessary; any further chlorine content was disregarded. The reported values for the melamines may therefore be slightly low.

(5) Calculations were based on the following assumptions:

$$R_2NCl + 2KI + H(OAc) \rightarrow K(OAc) + KCl + I_2 + R_2NH$$

$$I_2 + 2Na_2S_2O_3 \rightarrow 2NaI + Na_2S_4O_6$$

$$\% \text{ Cl} = \frac{V \times N \times 0.0177 \times 100}{W}$$

Where V = total volume of thiosulfate (ml)

N = normality of thiosulfate (0.025)

W = dry weight of fabric sample (grams)

Note that this is actual % Cl, not "available Cl." The latter is a measure of oxidizing power, and would be equal to twice the actual elemental chlorine content.

The rayon challis, dry and untreated, weighed an average of 0.205 grams per 19.1-cm^2 disc, and this was used as the sample weight so that all calculations had a common basis, the weight of original cellulose. This test, while designed for speed rather than precision, was found to be suitable for the comparative tests we were undertaking, and was adopted without further refinement.

HOT-IRON TEST — (1) The chlorinated and rinsed fabric was dried in air at room temperature, then conditioned at 65 per cent r.h. and 72°F. for at least two, and not more than sixteen hours.

(2) The fabric was placed between electrically heated iron plates for a definite time at the prescribed temperature. Our iron (Fig. 2), unlike the Suter tester *(7)*, had both surfaces directly heated. While the weight of the iron is not likely to be critical, we may state for the records that average pressure on the fabric sample approximated 25 g. per sq. cm.

The device was composed of two sections of channel iron, hinged together at one end, each being heated by a rheostat-controlled 250-W strip heater. The temperature was checked before use and at intervals during use by means of an electrical pyrometer. The total heating surface (each face) was 10" x 1⅞", but only the center three or four inches of length was used because the temperature could be quite carefully controlled in that area. Most of the ironing was conducted at 400 ± 4°F.

(3) The ironed fabric was allowed to condition for at least four hours before tensile-strength tests were made. Three breaks (1" ravelled strip) were made on each sample.

Now, whereas chemical analysis will directly reveal the amount of retained chlorine, and therefore the potential danger, the actual damage (as tensile loss) is a complex function of the amount of chlorine, the protective action of the resin, the heat of the iron, and other conditions. It seems obvious that the tensile strength of the chlorinated and ironed fabric depends upon the following factors:

(a) The tensile strength of the original untreated fabric.

(b) The effect of the resin treatment on the tensile strength.

(c) The effect of the wet chlorination on the cellulose.

(d) The effect of the heat of the iron on the cellulose.

(e) The effect of the chlorine (or HCl) liberated during the hot ironing.

Without attempting to anticipate the results of the present study, we might combine common sense with past experience to make a few generalizations. For a given fabric, factor (a) will be reasonably constant. The effect of factor (b) will vary with the resin treatment, and may represent either an increased or a decreased strength. The wet chlorination (c) could have a negligible effect under mild conditions, but under accelerated laboratory conditions of concentration, time, and temperature, the loss may be appreciable. The heat of the iron (d) should have a rather minor effect in the absence of chlorine, and for short times at temperatures not in excess of 400°F. Finally, factor (e), the loss due to liberated chlorine (or hydrochloric acid) on ironing, may be almost undetectible under mild conditions of treatment, but may cause complete fabric degradation in a severe laboratory test. It is really factor (e) in which we are interested, but we must remember that the other factors are also operating.

In the present study no attempt was made to assign values to the individual effects of these five factors. Instead, by means of accelerated test procedures (employing rather severe chlorination and ironing conditions) it was possible to increase factor (e) to such an extent that (b) and (d) were relatively negligible; and while factor (c) also increased in some instances, this too was relatively small in proportion to (e). An untreated (resin-free) swatch of the same fabric, chlorinated and ironed along with the test fabrics, was used as a control. Whenever this control fabric maintained a high value, it was assumed that any sharp drop in strength of the other fabrics was due to (e), the retained chlorine released on ironing.

COMPARISON OF ANALYTICAL PROCEDURES

Although the iodimetric method outlined above was considered adequate for comparing the residual-chlorine contents of bleached fabrics, we have briefly explored other methods to confirm the absolute values obtained. These methods comprised the following:

(1) Conversion of the chloroamine to chloride by reduction with $NaHSO_3$, and titration of the chloride with $AgNO_3$. Ten discs (2.05g.) of fabric were immersed in 50 ml. of distilled water containing 0.5g. $NaHSO_3$ and 0.5g. Na_2CO_3, the latter to keep the solution alkaline. The mixture was brought to a boil, and maintained for ten minutes with intermittent agitation. The reaction was presumed to be:

$$R_2NCl + NaHSO_3 + 2Na_2CO_3 + H_2O \rightarrow R_2NH + NaCl + Na_2SO_4 + 2NaHCO_3$$

The solution was decanted and the fabric rinsed several times in small portions of water, which were added to the main solution along with 0.5 ml. of H_2O_2 (30%) to decompose any excess of $NaHSO_3$. Phenolphthalein indicator was added, the pink color discharged by dropwise addition of dilute acetic acid, and the chloride titrated with 0.1N $AgNO_3$ in the presence of Na_2CrO_4 indicator. The latter is a standard method for chloride ion *(6)*.

To check the efficiency of the removal of positive chlorine from the fabric, the extracted discs were steeped in acidified KI-starch solution. In every case this gave a negative result, indicating complete removal of chlorine.

(2) Conversion of the chloroamine to chloride by H_2O_2 (which, under certain conditions, can act as a reducing agent) followed by titration with $AgNO_3$. One ml. of H_2O_2 (30%) and 0.5g. of Na_2CO_3 were added to 50 ml. of water; the subsequent procedure was similar to that of the preceding method. The reaction should go as follows:

$$R_2NCl + H_2O_2 + Na_2CO_3 \rightarrow R_2NH + NaCl + NaHCO_3 + O_2$$

This method was effective in the case of a chlorinated-urea resin, but did not give complete removal of the Cl when a chlorinated-melamine was analyzed. Both results are reported, however, for the benefit of persons interested in analytical procedure.

(3) Reduction of the chloroamine with 0.1N Na_2AsO_3, back titrating the excess of arsenite with 0.1N iodine. The reduction was attempted under both acid and neutral conditions, although the titration was conducted in the presence of the prescribed $NaHCO_3$ buffer *(4, 5)*. Removal of the positive chlorine was almost, but not quite, complete, as determined by subsequent KI test. Only a few trials were made on small (0.205-g.) samples, and the data accordingly cannot be considered a study of the method. However, agreement with the bisulfite reduction method was good, especially in one case where the residual Cl was determined and added to the original titration value.

(4) In addition, variations were made in type and quantity of acid and in time of agitation during the iodimetric procedure. This study confirmed the belief that

TABLE Ia
ANALYSIS OF A FABRIC CONTAINING A CHLORINATED UREA RESIN (TYPE A)

Method	*Sample Size (g)*		*% Cl*	*Subsequent KI-Starch Test*
Bisulfite reduction to chloride	2.05	As outlined under method 1. Chloride determined by $AgNO_3$ titration	1.57	Negative—shows complete removal of Cl.
Peroxide reduction to chloride	2.05	As outlined under method 2.	1.51	Negative

TABLE Ib
ANALYSIS OF SAME FABRIC BY IODIMETRIC PROCEDURES

Method	*Sample Size (g)*	*KI (30% (ml)*	*Acid (ml)*	*H_2O (ml)*	*% Cl 15 min.*	*% Cl 45 min.*
Iodimetric	0.205	3	5(HOAc)	5	1.53	1.61
method	0.205	3	5(HOAc)	5	1.44	1.55
(Using	0.205	3	5(HOAc)	5	1.50	1.55
Acetic Acid)	0.205	3	5(HOAc)	5	1.50	1.59
				Average	1.49	1.58
(Using	0.205	3	1(HCl)	10	1.35	1.66
hydro-	0.205	3	1(HCl)	10	1.42	1.68
chloric	0.205	3	1(HCl)	10	1.37	1.68
acid)	0.205	3	1(HCl)	10	1.37	1.68
				Average ..	1.38	1.68
(No acid)	0.205	3	—	10	0.77	0.95
(Blank on	None	3	5(HOAc)	5	0.05	0.05
reagents)	None	3	1(HCl)	10	0.07	0.07

TABLE IIa
ANALYSIS OF A FABRIC CONTAINING A CHLORINATED MELAMINE RESIN (TYPE C)

Method	*Sample Size*	*Details*	*% Cl*	*Subsequent KI-Starch Test*
Bisulfite reduction to chloride	2.05	As described under Method 1	2.18	Negative—complete decomposition of chloroamine.
	0.615	As described under Method 1	2.29	Negative—complete decomposition of chloroamine.
		Average	2.24	
Peroxide reduction to chloride	2.05	As described under Method 2. Note that reduction was incomplete.	1.79	Strong positive—considerable R_2NCl remaining.
		Arsenite 0.1N (ml) / H_2SO_3 20% (ml) / H_2O (ml)		
Sodium Arsenite Method	0.205	20 / 1 / 20 Shaking time 15 min. Titrate in presence of fabric.	1.91	Faint positive
Sodium Arsenite Method	0.205	20 / 1 / 20 Shaking time 30 min. Titrate in presence of fabric.	2.17	Faint positive
Sodium Arsenite Method	0.205	20 / — / 20 Shaking time 15 min. Titrate in presence of fabric.	2.08	Faint positive
Sodium Arsenite Method	0.205	20 / — / 20 Shaking time 30 min. Decant, rinse fabric well, titrate combined solution in absence of fabric.	2.13*	Faint positive *(Subsequent iodimetric titration on this sample: 0.10% residual Cl)

TABLE IIb
ANALYSIS OF SAME FABRIC BY IODIMETRIC PROCEDURES

Method	*Sample Size (g)*	KI (30%) (ml)	Acid (ml)	H_2O (ml)	*% Cl 15 min.*	*% Cl 30 min.*	*% Cl 45 min.*
Iodimetric method (Using acetic acid)	0.205	3	5(HOAc)	5	1.77	1.93	2.08
	0.205	3	5(HOAc)	5	1.63	1.90	1.99
	0.205	3	5(HOAc)	5	1.85	2.12	2.19
	0.205	3	5(HOAc)	5	1.75	1.94	2.05
				Average ..	1.75	1.97	2.08
Iodimetric method (Using acetic acid)	0.205	3	1(HOAc)	10	1.37	1.79	1.97
	0.205	3	1(HOAc)	10	1.43	1.83	1.99
	0.205	3	1(HOAc)	10	1.35	1.79	1.96
	0.205	3	1(HOAc)	10	1.37	1.77	1.90
				Average ..	1.38	1.80	1.96
(Using hydrochloric acid)	0.205	3	1(HCl)	10	1.43	1.85	2.08
	0.205	3	1(HCl)	10	1.64	1.99	2.19
	0.205	3	1(HCl)	10	1.50	1.88	2.12
	0.205	3	1(HCl)	10	1.50	1.81	1.96
				Average ..	1.52	1.88	2.09
(Using hydrochloric acid)	0.205	3	0.1(HCl)	10	1.32	1.75	1.90
	0.205	3	0.1(HCl)	10	1.39	1.81	2.01
	0.205	3	0.1(HCl)	10	1.32	1.77	1.99
	0.205	3	0.1(HCl)	10	1.26	1.63	1.86
				Average ..	1.32	1.74	1.94
(No acid)	0.205	3	—	10	1.06	1.21	1.21

After the 45-minute period, the solution was acidified; there was an additional liberation of I_2, which ran the total up to 1.39.

the melamines release their chlorine more slowly than do the ureas, that acetic acid seems more effective than hydrochloric, and that the large quantity of acid used in our standard method aids in the removal of the chlorine from the fabric. When hydrochloric acid is used, the fabric becomes dark brown, but comparatively little I_2 is discharged into the solution where it can be titrated. Perhaps some of the iodine is held as iodoamine, R_2NI. Acetic acid seems to bring more of the liberated I_2 into solution, and so expedites the titration.

(5) A simple experiment showed the reason why low results are obtained when no acid is used:

A chlorinated melamine fabric, immersed in distilled water, had a pH of 3.5. A solution of KI had a pH of 6.5. When the two were mixed, the pH rose to 9, due to the liberation of KOH:

$$R_2NCl + 2KI + H_2O \rightarrow R_2NH + KCl + I_2 + KOH$$

When such a mixture is titrated with thiosulfate, only part of the iodine is accounted for. If the solution subsequently be acidified, additional iodine is liberated; but the titration value never reaches the total expected from the quantity of chlorine present.

Two experiments were carried out, one with a chlorinated melamine, the other with a chlorinated urea, in which several of the above methods were employed to compare analytical procedures. The first involved a fabric treated with a urea-formaldehyde resin (type A). This was given an accelerated laboratory chlorination comprising 0.40% available Cl for 10 minutes at 140°F., followed by a thorough rinsing. Discs (0.205g.) of this fabric were cut out and analyzed by several procedures, with the results shown in Tables Ia and Ib.

From the data it is obvious that the analysis of a chlorinated urea resin offers no particular problems. Despite the small sample size the iodimetric method showed good precision within the groups of quadruplicate analyses, and satisfactory accuracy when compared with the chlorine determinations. No marked advantage of acetic acid over hydrochloric is indicated, but some acid is necessary.

The second experiment involved a fabric treated with a methylated melamine (type C). This was chlorinated and rinsed as in the preceeding experiments, then analyzed. Results are given in Tables IIa and IIb.

From the data in Table IIa it seems reasonable to suppose that the fabric contains about 2.20 ± 0.10% chlorine. Comparing with Table IIb, we conclude that the iodimetric method gives slightly low results on a heavily chlorinated melamine resin of type C, even when a 45-minute shaking period is allowed. In each case the higher concentration of acid gives the better result; and while 5 ml. of acetic and 1 ml. of hydrochloric give nearly identical final results (45 minutes), the acetic shows a decided advantage during the initial (15-minute) period. Where no acid is used, the result is very low, and remains low even when the solution is subsequently acidified.

As was stated earlier, the titration values on chlorinated ureas (including both types A and D) should be nearly correct even though only one 15-minute shaking is given; while the values on melamines (including both types B and C) will be somewhat low even though several 15-minute periods are allowed. An advantage

TABLE III
EFFECT OF CHLORINE—BATH CONCENTRATION ON CHLORINE RETENTION AND TENSILE STRENGTH

Resin Treatment	Available Chlorine in Bath									
	0.005%		0.05%		0.10%		0.40%		1.00%	
Solids Applied*	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.
Untreated	0.02	40	0.05	41	0.03	40	0.06	39	0.05	37
15% Urea A	0.11	45	0.43	42	0.75	15	2.11	2	3.52	2
15% Melamine B ...	0.18	46	0.53	40	—	—	2.60	2	4.70	2
12% Melamine C ...	0.08	44	0.26	45	0.95	39	2.18	2	3.57	2
8% Mod. Urea D ..	0.06	42	0.18	40	0.26	39	0.32	40	0.30	35

*Resin concentration was based on the quantity necessary to give approximately equal stabilization and creaseproofing effect; it will be shown later that resin concentration is not a particularly critical factor.

of the KI method, however, lies in the fact that an incomplete reaction is visually evident by the continued evolution of iodine at the end of the titration; whereas with the arsenite method, even though the few trials herein reported showed promise, there is no outward sign to indicate whether the reaction has gone to completion, and no way to allow an additional time of reaction after the first titration has been made. There is room for further experiment in this field. We would suggest the possibility of shredding the fabric before analysis and/or using heat to hasten the reaction. In the KI method, the addition of a solvent (ethyl acetate has been suggested for this purpose) or possibly the use of an even higher concentration of acetic acid may be worthwhile.

The above brief study having shown the possible error in our method of analysis, while giving general confirmation to the values reported, we shall now proceed with the study of chlorination variables.

CHLORINATION VARIABLES

EFFECT OF CONCENTRATION OF CHLORINE BATH.—This study covers the range from about one-half the usual laundry bath concentration, up to one hundred times that amount.

Conditions of test: 30-1 bath ratio, 10 minutes at 140°F., standard rinse cycle (six five-minute rinses).

In Table III, *% Cl* is the retained chlorine by analysis, and *Ten.* is the tensile strength (1" ravelled strip) after ironing for 30 seconds at 400°F. The 2-lb. tensile value, which recurs so frequently, is the lowest reading given by the inclined-plane tester used; for all practical purposes this value may be considered as zero.

It is obvious from the above data that the retained chlorine is low and tensile loss is negligible at the 0.005% bath concentration, despite the rather high 30-1 bath ratio. Even at 0.05%, which is five times the recommended laundry-bath concentration, there is no marked tensile loss on subsequent ironing. As the bath concentration increases, however, resins A and B and C pick up increasing amounts of chlorine, while resin D levels off at about 0.3%.

Note also that, in general, appreciable tensile-strength loss on ironing does not occur until the retained chlorine reaches 0.4 to 0.5%. When retained chlorine reaches 2% however, complete tensile loss occurs during the 400°F. ironing test.

Yellowing on chlorination was observed only in the case of B and C. The methylated melamine C became noticeably yellow during the 0.10% chlorination, and increasingly so as the concentration increased; the melamine B turned bright yellow under the more severe conditions. The urea resins remained white in all cases.

On ironing, at the 0.40% level, resin A showed a deep brown char; B and C were moderately brown; D and the untreated control remained essentially white.

It is doubtful that a commercial laundry would use a chlorine concentration very greatly in excess of the prescribed 0.04% on fabric (or 0.1% on bath). Depending on the method of adding the hypochlorite to the bath, however, it is conceivable that a local high concentration of chlorine could persist for a time after the addition of the bleach. Furthermore, in home laundering there is often displayed an amazing lack of restraint in the quantity of bleach used. Chlorine damage, therefore, could result because of the tendency of some resins to retain excessive quantities of chlorine whenever the bleaching bath exceeds a certain concentration.

EFFECT OF RESIN CONCENTRATION.—Conditions of test: 0.40% avail. chlorine (on bath), 30-1 bath ratio, 10 minutes at 140°F., standard rinse cycle.

Here a severe chlorination (0.40%) was employed to increase the magnitude of the effect.

Table IV shows the retained chlorine (% Cl) and the tensile strength after 30 seconds of ironing at 400°F.

We conclude that resins A and D show increasing pickup with increased concentration, though not in direct proportion. Resins B and C show a maximum at around 10%; perhaps steric hindrance retards chlorine pickup as the concentration increases further.

The figures are not to be considered absolute values, however, because of the fact that for convenience all the samples were chlorinated in the same bath. This procedure may have introduced some complications. In actual practice, of course, many types of fabrics, treated and untreated, are likely to be chlorinated at the same time; but this is not to be construed as a recommended laboratory procedure where exact values for the chlorine-retentive capacities of various resins are desired.

Resin B acquired a bright yellow hue during the chlorination; C was somewhat less yellow in color. A and D remained white. On ironing, A charred deep brown, B and C charred to a medium brown, while D showed a slight browning at the 15% concentration.

Comparison of Tables III and IV leads to the conclusion that the concentration of the chlorine bath is a more critical factor than concentration of resin on the fabric.

TABLE IV
EFFECT OF RESIN CONCENTRATION ON CHLORINE RETENTION AND TENSILE STRENGTH

Resin	Resin Concentration on Fabric					
	5%		10%		15%	
	% Cl	Tensile	% Cl	Tensile	% Cl	Tensile
Urea A	1.19	2	1.74	2	2.13	2
Melamine B	2.44	2	2.77	2	2.30	2
Melamine C	1.55	2	1.85	2	1.60	2
Mod. Urea D	0.25	46	0.33	43	0.49	33

EFFECT OF CHLORINATING TEMPERATURE.—

Conditions of test: 0.40% avail. chlorine (on bath), 30-1 bath ratio, time—10 minutes, standard rinse cycle.

Table V shows % retained Cl and tensile strength after 30 sec. of ironing at 400°F.

The figures show that resin A has the greatest chlorine pickup at the lowest temperature (100°F.), with consistently lower pickup as the temperature rises.

It is evident that the chloroamine (or chloroamide) formed in the case of a urea resin is thermally unstable, so that higher temperatures work against its formation. Because the chlorination was at a drastic level (0.40%) the decreased pickup did not noticeably aid the strength; but it is quite likely that during a more nearly normal chlorination, the same decreased pickup at high temperatures would occur, with an appreciable increase in strength after ironing. We must recall in this connection that the recommended temperature of chlorination is around 160°F. Resins B and C retained the least chlorine at 100°F. and showed a maximum at 160°F; the chloroamine is apparently fairly stable to heat. Resin D showed a rather consistently low pickup of chlorine. It also showed an advantage over the untreated control during the 180°F. chlorination, where the presence of the resin apparently protected the fabric against the effects of the wet chlorination (factor (c) in the earlier discussion), which caused the control to show a tensile drop despite negligible retained chlorine.

Following chlorination at the lowest temperature, the melamine resins exhibited considerable strength retention despite their high chlorine content. Both fabrics were strongly yellowed, however.

EFFECT OF BATH RATIO.—

Conditions of test: 0.10% available Cl (on bath), 10 minutes at 140° F., standard rinse cycle.

Table VI shows % retained Cl and tensile strength after ironing 30 sec. at 400°F.

Bath ratio is expressed as weight of solution per unit weight of fabric.

In evaluating the above data, we must again recall that recommended laundry procedure calls for 0.04% available Cl on weight of fabric. Here the mildest condition used was 0.10% Cl at 10/1, or 1.00% Cl on weight of fabric, yet no marked tensile loss resulted in any case. On increasing the bath ratio, however, there was a sharp increase in both chlorine retention and damage (except in the case of resin D). Now, such a high bath ratio is possible in actual practice, since there may be only one resin-treated garment in an entire wash load. Even though much of the hypochlorite would be used up in bleaching the clothing, and much of the balance would be trapped in such a way that it could not reach the resin-treated garment, yet we must concede that high bath ratios are not only possible but quite probable, insofar as resin-treated garments are concerned.

In the above trials, slight yellowing of the melamines was apparent even at the 10/1 bath ratio. Charring on ironing was first observed in the case of resin A at a bath ratio of 30/1, and was very pronounced on A, B, and C at 150/1.

TABLE V
EFFECT OF CHLORINATING TEMPERATURE ON CHLORINE RETENTION AND TENSILE STRENGTH

Resin	Chlorinating Temperature									
	100°F.		120°F.		140°F.		160°F.		180°F.	
	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.
Control	0.09	46	0.09	49	0.11	40	0.11	37	0.11	21
15% Urea A	2.56	2	2.35	2	1.83	2	1.69	2	1.29	2
15% Melamine B	1.66	21	2.42	6	2.51	2	2.56	2	2.41	2
12% Melamine C	1.67	26	2.02	7	2.07	2	2.91	2	2.28	2
8% Mod. Urea D	0.33	50	0.38	38	0.35	47	0.40	43	0.38	43

On comparison of the first four tables, it is obvious that the chlorine concentration of the bath and the bath ratio are more important than the resin concentration or the temperature of chlorination.

EFFECT OF TIME OF CHLORINATION.—Conditions of test: 0.20% avail. Cl (on bath), 30-1 bath ratio, 140°F. standard rinse cycle.

Table VII shows the retained chlorine and the tensile strength after an ironing at 400°F.

In general, increased time of chlorination caused increased chlorine retention, but not proportionately so; most of the pickup took place in the first few minutes during the 140°F. chlorination. Once again the urea resin A was first to show tensile loss, while the melamines (especially B) showed marked yellowing within the first four minutes. Resin D showed neither effect.

EFFECT OF TEMPERATURE OF IRONING.—The tensile data so far reported were obtained on fabrics that had been ironed for 30 seconds at 400°F., a test condition in wide use for many years since it represents the maximum heat a fabric is likely to encounter in any normal use. To determine the effect of lower ironing temperatures, further tests were made on a series of fabrics from the preceding section.

Preparation of fabrics: 0.20% avail. Cl (on bath), 30-1 bath ratio, 8 minutes at 140°F., standard rinse cycle.

Ironing test: 30 seconds at specified temperature.

It is obvious that the temperature of ironing has considerable influence on the resulting tensile loss. Despite the high chlorine contents resulting from the accelerated chlorination conditions, no tensile loss resulted when the fabrics were pressed at 250°F. At 300°F., however, resin A showed definite charring and tensile loss in the 30-second ironing period, and at 400°F. resins B and C showed similar adverse effects. Resin D, like the untreated control, exhibited no appreciable discoloration even at 400°F., but this was doubtless due more to the low chlorine content than to superior heat resistance of the finish.

EFFECT OF NUMBER OF RINSES.—Up to this point all chlorinated fabrics had been given six 5-minute rinses at 100°F. in a washwheel at a very high liquid/fabric ratio to insure thorough rinsing. To determine the effect of fewer rinses, the following study was undertaken:

Preparation of fabric: 0.20% avail. Cl (on bath), 30-1 ratio, 10 minutes at 140°F.

Rinsing Conditions: 100° in washwheel at high liquor/fabric ratio (at least 100/1).

Because of the great liquid/fabric ratio employed, this should not be regarded as approximating a laundry rinsing cycle. Nevertheless it is obvious that a relatively few rinsings will remove any free (unbound) chlorine from the fabrics, and that further rinsing at 100°F. will not greatly affect the residual chlorine, which is chemically bound as chloroamine.

EFFECT OF TEMPERATURE OF RINSES.—In this experiment, chlorinated fabric from the previous study was employed.

Rinsing Conditions: in washwheel, at high liquor/fabric ratio; four 5-minute

TABLE VI
EFFECT OF BATH RATIO ON CHLORINE RETENTION AND TENSILE STRENGTH

Resin	Bath Ratio							
	10/1		30/1		50/1		150/1	
	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.
15% Urea A	0.43	42	1.03	8	1.23	5	1.62	2
15% Melamine B	0.35	48	1.03	19	1.18	14	1.36	8
12% Melamine C	0.26	46	0.60	40	1.13	22	1.23	7
8% Mod. Urea D	0.15	49	0.23	47	0.23	44	0.28	43

TABLE VII
EFFECT OF TIME OF CHLORINATION ON
CHLORINE RETENTION AND TENSILE STRENGTH

Resin	Time of Chlorination					
	4 min.		8 min.		20 min.	
	% Cl	Tensile	% Cl	Tensile	% Cl	Tensile
Control	0.05	38	0.05	38	0.09	37
15% Urea A	1.33	2	1.47	2	1.62	2
15% Melamine B	1.24	29	1.27	11	1.76	2
12% Melamine C	1.22	19	1.27	14	1.60	2
8% Mod. Urea D	0.28	45	0.28	43	0.33	38

TABLE VIII
EFFECT OF IRONING TEMPERATURE ON
CHLORINE RETENTION AND TENSILE STRENGTH

Resin	Ironing Temperature, °F					
	% Cl	200	250	300	350	400
Control	0.05	45	45	—	46	38
15% Urea A	1.47	50	49	13	2	2
15% Melamine B	1.27	49	50	—	42	11
12% Melamine C	1.27	41	42	—	37	14
8% Mod. Urea D	0.28	47	50	—	47	43

rinses at the designated temperatures.

Table X shows the % retained Cl and the tensile strength after 400°F. ironing following rinsings at 70, 100, 160 and 200°F.

From the data it is apparent that the temperature of rinsing is far more important than the number of rinses. In the case of resin A the higher temperatures cause a breakdown of the chloroamine and result in lower retained chlorine and higher strengths. Resin C shows no loss of chlorine until the temperature exceeds 160°F., while resins B and D show erratic behavior. Apparently two forces are acting: the more efficient rinsing action at the higher temperatures is counterbalanced by the tendency of some of the resins to form chloroamines at those temperatures (compare Table V). Further, since all the samples in each group were rinsed in the same bath, it is possible that one resin picked up some of the chlorine that was being removed from another.

Recommended laundry practice calls for rinsing at high temperatures (e.g. 160 to 170°F.) immediately following the bleaching step, though it is doubtful that all laundries follow this procedure.

CONCLUSIONS

In this study of the effect of chlorination and ironing variables on the chlorine retention and tensile strength of four types of resin treatments, we have obtained the following indications:

(a) The following factors have considerable bearing on the quantity of chlorine retained by a resin-treated fabric:—

(1) Concentration of the hypochlorite bath (Table III).

(2) Bath ratio (Table VI).

(3) Type of resin treatment (all tables).

Too high a concentration might occur because of the accidental or intentional use of too much bleach, while a local high concentration could result if the bleach is improperly added. The bath ratio, which rarely exceeds 4 to 1 in commercial laundering, may in effect be much higher because only a small part of any given load would be resin treated. The kind of resin treatment is important in that at least one type (resin D) shows decided resistance to overdoses of chlorine, although it does retain a small amount of chlorine even after very mild bleaching.

(b) The following factors have a lesser effect on the quantity of retained chlorine:

(1) Temperature of rinsing (Table X).

(2) Number of rinses (Table IX).

(3) Temperature of chlorination (Table V).

(4) Time of chlorination (Table VII).

(5) Concentration of resin (Table IV).

We must bear in mind that several factors that were not studied could have marked influence on the above groupings. For instance, degree of agitation during chlorination could influence the effect of time of chlorination; and the liquor-to-fabric ratio during rinsing could influence the effect of number of rinses. In addition, most of the data were obtained under accelerated test conditions; perhaps further studies under more normal laundering conditions would alter the relative listings. In the absence of information to the contrary, however, we feel that the groupings are substantially correct.

(c) The following factors influence the tensile loss on ironing subsequent to chlorination:

(1) Temperature of ironing (Table VIII).

(2) Concentration of retained chlorine (Tables III, V, VI).

(3) Type of resin treatment (Table VIII).

Here again other pertinent factors, such as time of ironing, were not studied; but this would not be likely to invalidate the above conclusions. It is important to recall, however, that some tensile loss may occur during the wet chlorination before ironing.

(d) The following differences between resin types are evident:

(1) Melamine B showed greatest yellowing during the wet chlorination; Melamine C was second in this respect.

(2) Urea A showed greatest charring on

TABLE IX
EFFECT OF NUMBER OF RINSES ON
CHLORINE RETENTION

Resin	Number of 100°F. rinses			
	2	4	6	8
	% Cl	% Cl	% Cl	% Cl
Control	0.07	0.07	0.07	0.05
Urea A	1.46	1.40	1.49	1.28
Melamine B	1.10	1.10	1.08	1.06
Melamine C	1.68	1.58	1.61	1.45
Mod. Urea D	0.30	0.30	0.30	0.30

TABLE X
EFFECT OF TEMPERATURE OF RINSES ON
CHLORINE RETENTION AND TENSILE STRENGTH

Resin	Rinsing Temperature, °F							
	70		100		160		200	
	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.	% Cl	Ten.
Control	0.11	34	0.07	48	0.09	46	0.11	35
Urea A	1.79	2	1.40	2	1.00	10	0.11	25
Melamine B	1.69	15	1.10	24	1.41	30	0.85	32
Melamine C	1.55	15	1.58	16	1.62	12	0.86	33
Mod. Urea D	0.40	36	0.30	45	0.35	43	0.16	38

ironing, and was the first to show tensile loss. The melamines B and C exhibited little tensile loss at low ironing temperatures.

(3) Modified Urea D showed no yellowing and negligible charring, due primarily to the relatively small amount of chlorine it retained.

(4) Urea A lost much of its retained chlorine when rinsed at 160°F.

It should be obvious from the data that small amounts of retained chlorine are harmless, but that greater amounts show up as yellowing or as tensile loss on ironing. The usual urea and melamine resins, subjected to mild chlorinations, show no adverse effects; but the margin of safety is rather small, and increased hypochlorite concentration, high bath ratio, and inadequate rinsing may combine to cause measurable damage and result in customer complaints. The modified urea resin (type D) has a much greater safety factor than the other types; it is expected that such a material would offer more resistance to overdoses of bleach, or to other factors or combinations of factors which would result in damage to the usual types of resin treatments.

ACKNOWLEDGMENT

The authors wish to acknowledge the contributions of Dr. O. B. Hager and D. W. Robinson, formerly of this laboratory, who took part in much of the earlier, unpublished work that served as a background for the present study; and of Mrs. Angela Simonson, who aided in the preparation and testing of many of the fabric samples.

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Mid-West Report, Spring Meeting

THE spring meeting of the Mid-West Section was held at the Hotel Schroeder, Milwaukee, Wisc., on May 6, 1950.

The afternoon technical meeting was called to order by the Vice Chairman and attended by approximately 110 members and guests. The first speaker was E. L. McCleary of the Special Products Division of the General Electric Company, Schenectady, New York. Mr. McCleary spoke on the recording photoelectric spectrophotometer and supplemented his talk with colored slides and a colored sound film entitled "Curves of Color." The second speaker was R. W. Beaudway of the Chicago office of the General Electric Company. He presented a colored sound motion picture, "Textiles Unlimited," and discussed the modernization of textile mills.

Dinner was served at 7:30 to 85 members and guests.

At the conclusion of the dinner, the Vice Chairman called the evening meeting to order. Joseph H. Jones reported on the recent Council meeting which he had attended. The Treasurer's report was read and accepted. J. G. Stott, reported on the forthcoming outing. It was voted that our absent Chairman be sent flowers with a wish for a speedy recovery from his recent operation. The Vice Chairman presented the speaker of the evening, Lee G. Johnston of the American Institute of Laundering, Joliet, Illinois. Mr. Johnston spoke about "Consumer Problems Relating to Textile Processes," and augmented his talk with a colored motion picture and various displays.

Respectfully submitted,
JOHN E. A. SCHRODER,
Secretary

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Mid-West Outing Program Announced

THE program for the Mid-West Section's Annual Outing to be held Saturday, June 17 at Lake Lawn Lodge, Delavan, Wisconsin, is as follows:

8:30 a.m.—Registration in hotel lobby
9:00 a.m.—Softball game
11:30 a.m.—Buffet luncheon
11:45 a.m.—Golf tournament
1:30 p.m.—Barnyard golf & ping pong tournaments
7:00 p.m.—Dinner

The barnyard golf tournament and ping pong competitions are again being held due to the large amount of interest shown last year.

Prizes will be awarded winners in all events, as usual.

J. G. Stott is Chairman of the Outing Committee and is being assisted by L. W. Blank, A. A. Coleman, J. H. Jones, H. T. Latham, L. B. MacFarland, and C H. Sindt.

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UTI Student Chapter Report

THE Utica Technical Institute Student Chapter met on Wednesday, May 3, 1950, and elected officers as follows:

Chairman—Ernest Larrat, Jr.
Vice-Chairman—Anthony Cassetta.
Secretary—George Aumick.
Treasurer—Louis Bien.

Plans were discussed for the spring outing. The time was set for the first week in June, and a committee appointed.

Arrangements are being made to show a film by Geigy Company on quality control.

Respectfully submitted,
GEORGE AUMICK, *Secretary*

CALENDAR

COUNCIL

Meetings: Sept. 28-30 (Portsmouth, N. H. Convention) Nov. 17 (New York).

NATIONAL CONVENTIONS

1950: September 28 to 30, Portsmouth, N. H
1951: October 18 to 20, Statler, New York
1952: Boston.

HUDSON-MOHAWK SECTION

Meetings: June 23 (Annual Outing, Shaker Ridge Country Club, Albany, N. Y.), Sept. 15 (Albany), Oct. 20 (Utica), Dec. 8 (Albany), Jan. 19, 1951 (Albany), Mar. 16, 1951 (Albany), May 11, 1951 (Albany), June 22, 1951 (Annual Outing).

MID-WEST SECTION

Meeting: June 17 (Annual Outing, Lake Lawn Lodge, Delavan, Wisc.), October 28 (Chicago, Ill).

NEW YORK SECTION

Outing: June 16.
Meetings: October 30 (Swiss Chalet, Rochelle Park, N. J.), November 17 (Swiss Chalet), Jan. 12, 1951 (Hotel New Yorker), Feb. 23, 1951 (Hotel New Yorker), March 30, 1951 (Swiss Chalet), May 4, 1951 (Swiss Chalet), June 15, 1951 (Outing).

PHILADELPHIA SECTION

Meetings: October 28 (Meeting-in-Miniature, Philadelphia Textile Institute), December 8, January 17, 1951.

PIEDMONT SECTION

Meetings: June 30-July 2 (Ocean Forest Hotel, Myrtle Beach, S. C.), October 28 (Charlotte, N. C.)

RESEARCH COMMITTEE

Meetings: Sept. (Portsmouth, N. H., Convention), Nov. 17 (New York).

RHODE ISLAND SECTION

Meetings: October 27 (Providence Engineering Society Hall), November 17 (Johnson's Commodore Room).

SOUTH CENTRAL SECTION

Meetings: August 18-19 (Summer Outing—Read House—Hotel Patten, Chattanooga Country Club—Chattanooga, Tenn.).

SOUTHEASTERN SECTION

Meetings: September 23 (LaGrange, Ga.), December 9 (Atlanta, Ga.).

WESTERN NEW ENGLAND SECTION

Meetings: June 23 (Outing at Wallingford, Conn., Country Club).

Hosiery Group—

A SURVEY OF RECENT DEVELOPMENTS IN THE WET-PROCESSING OF FULL-FASHIONED HOSIERY*

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The problems of dyeing 15-denier monofilament bright nylon yarn are reviewed. The current problem of dyeing Type-600, dull, 20-denier monofilament nylon in combination with multifilament semidull nylon is discussed with presentation of laboratory data. Resin finishing emulsions for the production of snag resistance and a full hand are compared.

THE hosiery industry has undergone an epoch-making transition within the last ten years. It has been a period in which the older cellulose synthetic yarns were re-entering the field of ladies' hosiery and during which the new synthetics, such as nylon, Vinyon, Aralac, etc., were introduced.

During this decade, overshadowed by the war, we experienced the peak of a period in which the silk worm was king, and we saw the development of the silk crepes and composition twists, which rendered the finest, sheerest and most elastic stockings. In the fall of 1938 nylon was announced to the public; however, on account of the war, it experienced a short life in the hosiery field at that time, as it was frozen along with silk for use in our war effort.

After the freezing of nylon and silk and during the war years, hosiery was manufactured from viscose, acetate, cuprammonium and cotton yarns or combinations of these fibers. The hosiery industry and its technical and chemical experts are to be complimented on the rapidity of the change-over from silk and nylon to rayon hosiery. The hosiery that was made during this transition proved to be extremely attractive and serviceable.

Today we are faced with problems confined almost wholly to nylon. Since the various steps of making suitable nylon yarn, consisting of spinning, drawing, control of denier, control of luster, throwing, etc., are in the competent hands of the DuPont Company and of the throwing mills, this paper will confine itself to the following subjects only as they affect dyers and textile finishers:

A—Review of multifilament hosiery
B—15-denier monofilament hosiery
C—20-denier monofilament hosiery
D—Finishes

REVIEW OF MULTIFILAMENT HOSIERY—Nylon hosiery prior to the war was made mostly from 40-denier, 30-denier and 70-denier yarns. Today a 30-denier stocking is already considered a service weight. In addition we find 20-denier multifilament, 20-denier monofilament, 15-denier monofilament and 2x10-denier multifilament stockings, the latter combinations being imitations of crepe twists. Experiments have also been conducted with 10-denier monofilament stockings.

We will assume that preboarding or setting of the fabric is strictly a mill problem. There appears to be no fixed rule regarding the most advantageous temperature, pressure or cycle required to preboard nylons. Therefore we will take for granted that all necessary precautions are being taken to produce a stocking of good quality.

Multifilament stockings regardless of the denier have relatively few processing problems. Most 30-denier multifilament stockings have either 60- or 50-denier multifilament welts and 40-denier reinforcements. The 50-denier multifilament yarn, type 200, dyes with a slightly variable dyeing index within one merge, but the 50-denier multifilament regenerated yarn has a pronounced variable dyeing index, and light and dark shades are found within one dye bath. Variation in methods of scouring or selection of dyes does not alter this condition. It is quite noticeable where dyestuffs, such as Nydyes or direct dyes, are used exclusively.

Preparation of stockings for dyeing presents more of a problem to the commission dyer than it does to a mill that enjoys the full cooperation of its throwster. In our case the problem is simplified because we can determine through checking and testing in our chemical laboratory what percentage of sizing, and what amount and kinds of oil should be used during the throwing and coning operations. Thus we are in a position to recommend to the throwster the best procedure for the respective type of yarn used in the manufacture of the stocking.

According to our knowledge there are two methods used for scouring nylon hosiery, namely, the single- and double-bath methods. In the single-bath method scouring and dyeing are done in the same bath. If there is excellent control over throwing and sizing, the single bath is the ideal method, for it is economical, effecting a saving in materials, labor and time. The double bath, as the name implies, removes the sizing and impurities from the hosiery prior to the actual dyeing operation. The double procedure must be used with extremely soiled hosiery containing an excess of graphite and other soil that was partially fixed to the nylon during the preboarding operation.

In dyeing multifilament hosiery we have adopted the single-bath method of scouring and dyeing and have found the following formula quite suitable:

4-6% of low-titer soap, such as Olate or Vertex Flakes.
2-4% of sulfated fatty alcohol, such as Du-Ponol D.
2-3% of trisodium phosphate.
Maximum dyeing temperature, 180°F.

In reviewing correspondence from the DuPont Company containing recommendations and directions, we find a few changes in dyestuffs for nylon hosiery. The Acetamine Yellow CG has been replaced by Acetamine Yellow N. The Celanthrene Pure Blue BR was replaced by Celanthrene Brilliant Blue FFS Conc. 200 per cent because the Blue BR type was very sensitive to the copper found in the Monel-metal-type dyeing machine. Acetamine Orange GR was discontinued for varied reasons. The Acetamine Scarlet B has survived the introduction of nylon.

From whatever sources of supply the acetate type of dispersed dyestuffs are still

* Presented before Hosiery Group at Annual Meeting in Atlantic City on Oct. 15, 1949.

the best and easiest to manage for nylon hosiery. In dyeing multifilament nylons, temperature and time will remedy any uneven dyeing.

15-DENIER MONOFILAMENT HOSIERY—The dyeing of stockings made from 15-denier monofilament main with either 30-denier, 40-denier or 50-denier multifilament welt yarn will be discussed under the following headings:

1. Packing
2. Scouring
3. Dyeing assistants
4. Dyestuffs
   a—acetate
   b—Nydyes
   c—direct
   d—chrome
   e—neutral acid
5. Dunn method

Most of the goods before dyeing are packed in the preboarding department. We have experimented with all types of materials for the containers in which stockings are packed for dyeing, such as plain-muslin nets, cotton-mesh bags lined with muslin, cotton- and spun-viscose-fabric sleeves or sausages, as some people call them, and, lastly, nylon bags. The number of stockings in each container was varied from two to four dozen, two dozen proving to be the best number.

The stockings in the nets were packed in several ways. In some instances each individual stocking was dropped in a bag, the bag then being sealed in the conventional way; other batches were double and triple folded in amounts of 6, 12 and 18 stockings and carefully placed in nets. The goods packed in sleeves or sausages were prepared by using a special trough arrangement developed by the mill. It appears that the method of packing goods in sleeves or sausages is ideal in helping to reduce pullers or snags, in facilitating the loading of a dye machine, and in saving time in the boarding department.

It is imperative before dyeing 15-denier monofilament stockings to give them an efficient scouring. The 15-denier monofilament usually contains no PM-90 sizing and oils, but the multifilament yarns, depending on the throwster's process, contains from 7.0 per cent to 9.0 per cent of these assistants. We are partial to soap as the main scouring ingredient and emulsifying agent, but in addition use one of the following alkalies: caustic soda, soda ash, trisodium phosphate, or tetrasodium pyrophosphate. The use of 6-8 per cent of soap and 2-3 per cent of alkali gives a pH value of approximately 11 and promotes excellent scouring.

The unemulsifiable types of knitting oils remaining in goods after preboarding are difficult to remove when stockings are packed in sleeves or sausages because of the compactness within the sleeves. If these oils are not wholly removed by proper scouring, trouble may be encountered later through the releasing of free oil on the inserts or tissues used in the final boxing operation. At least we were never successful in removing knitting oils completely from 15-denier monofilament hosiery by the one-bath method, that is, by scouring and dyeing in one operation.

Some of the types of dyestuffs to be discussed were and are being used in production, while others were used only on an experimental basis. The acetate type without doubt appears to be the most suitable for dyeing. In the discussion of acetate dyes for the dyeing of 15-denier monofilament hosiery we all are faced with the following problems: level dyeing, temperature control, length of dyeing cycle, good unions, and good shade matches.

When we consider the technique of level dyeing we must also include the problem of dispersion and wetting. The auxiliaries used today mostly are of the fatty type. First we had the sulfonated oils, followed by the alcohol sulfates, such as DuPonol D, alkylarylsulfonates (the so-called Nacconols), the alkylsulfonates (DuPont's Merpol), and sulfonated amides (Igepon T); in addition to the above types there are the sulfated and sulfonated esters (Igepon AP), sulfonated and sulfated amines, alkylarylpolyethers (Triton NE and Igepal CA), etc.

In order to study the leveling action of various dyebaths in comparative tests with alkalies we used the simple method of placing one dyed and one undyed stocking for 30 minutes at 180°F. in the following baths:

Bath	Grams of Alkali in 700 ml. of Water
A	2.3 trisodium phosphate
B	2.3 tetrasodium pyrophosphate
C	2.3 hexasodium tetraphosphate
D	2.3 sodium carbonate
E	2.3 conc. ammonia water
F	none

The stockings from B, E and F were similar, that is, tetrasodium pyrophosphate and ammonium hydroxide solutions had the same effect as plain water. The dyed stockings kept their brightness and the undyed stockings were of a weak, dead, yellow color.

On the stockings from A and D, trisodium phosphate and sodium carbonate solutions had the same effect. The dyed stockings showed a drastic change and turned red, while the undyed stockings were light beige.

The stockings from C, treated with the Quadrafos solution, were different from all the other sets. The undyed stockings had a light beige color similar to the one of bath A, and the dyed stocking kept its original brightness. It was even closer to the original dyeing than the stocking treated in water only.

As far back as 1946 we were faced with the trouble of obtaining the same depth of shade between welt of multifilament yarn and the boot of 15-denier monofilament type-400 nylon. At that time DuPont recommended as dyestuffs Acetamine Orange GR Conc. 175 per cent and Celanthrene Brilliant Blue FFS Conc. 200 per cent, the goods to be dyed in a DuPonol, soap, trisodium phosphate bath between 180-190°F.

Many dyeing methods and procedures have been tried without success to eliminate the difficulty. The only solution of the problem was to avoid the dyeing trouble by making a stocking with all 15-denier construction.

It was during this period that we did experimental work with DuPont's assistance, using tannic acid as a pretreatment. For those of you unfamiliar with this process a short review is in order. The hosiery is scoured by the conventional method and rinsed thoroughly. To the bath at 90-100°F. the following ingredients are added:

For Light and Medium Shades

5.0% of tannic acid (comm. grade)
0.5% of sulfated fatty alcohol
0.5% of acetic acid, 56%
For darker shades the above percentages are doubled.
Raise temperature to 125-130°F., add dye and raise to 160°F.
Run ½-¾ hrs. and sample.

Later we made experiments in which we replaced the acetic acid of the tannic acid method with alkalies because there was a chance that too much acid might cause uneven absorption of the tannic acid. Dyebaths were made up according to the following formula with different alkalies, chemicals being calculated on weight of fiber:

10% of tannic acid
10% of sulfated fatty alcohol
1% of alkali

The alkalies tried were the following, all of which in the amount employed gave a resultant pH value of 6.6 to 6.7:

1. trisodium phosphate
2. sodium carbonate
3. ammonia water, conc.
4. sodium bicarbonate

Our next experiment in collaboration with DuPont's technicians was one in which tannic acid, tin salts and zinc salts were used to form insoluble tannate on the nylon. The procedure was as follows:

10% of tannic acid
5% of formic acid, 85%

Temperature is raised to 160°F. and the stockings are run for 15 minutes. 5% of stannic chloride or 5% of zinc chloride o.w.f. is added and the stockings are treated for 10 minutes and rinsed. They are then dyed in a bath containing the following assistants:

2% of trisodium phosphate
2% of soap
2% of sulfated fatty alcohol

It can be concluded from these experiments that the combination of tannic acid and acetic acid gave the best match between boot and welt. However, a fairly

high percentage of uneven dyeings was noticed.

In all the dyeings the problem of migration is ever present. The blue appears to be the bad actor. The longer the time of running, the heavier the main yarn becomes, with the welt losing depth at the expense of the boot. In order to prevent migration some people are of the opinion that the particle size of the dye must be kept large by carrying out the dyeing in an acid or neutral bath. As soon as dyeing is carried out in a highly alkaline bath poor unions are obtained, presumably because the alkali promotes dispersion.

Experiments in line with this theory were carried out in collaboration with DuPont. Instead of scouring the goods, we treated them for 40 minutes at 170°F. in the following bath:

10% of Protolin
3% of sulfated fatty alcohol
3% of formic acid

The dye bath was adjusted with sulfated fatty alcohol and acetic acid, the pH of the bath registering between 5.0-5.2 In addition, the dyes were dispersed with denatured alcohol. The maximum dyeing temperature was 160°F. This gave a fair union, but it still left room for improvement.

Another later experiment with DuPont, which is of some interest and which some of you probably conducted, had to do with applying acid dyes to nylon in an alkaline bath. Some success was obtained on spun nylon. The following dyes were tried:

DuPont Milling Red SWB Conc. 125 per cent
DuPont Milling Yellow 5G Conc.
DuPont Neutral Brown BGL.
DuPont Neutral Grey L Conc.
DuPont Anthraquinone Blue RXD.
DuPont Anthraquinone Violet 3R
DuPont Anthraquinone Blue SWF Conc. 175 per cent
Pontacyl Fast Red AS Ex. Conc.

An experimental dyeing was run as follows:

2.5% of M.P. 189
3.0% of DuPont Neutral Brown BGL
0.1% of DuPont Milling Yellow 5 G Conc.
0.2% of DuPont Neutral Grey L Conc.

Dyeing was started at 100°F., the temperature was raised to the boil in one-half hour and dyeing was continued at the boil for one-half hour. Sampling after 1 hour showed the union to be unsatisfactory. Additional boiling and further standing did not improve the union. The pH of the dyebath was 8.7. As this was strictly a dyeing experiment, the final appearance of the fabric was of secondary importance.

After many experiments it is evident that every dyer must select his own procedure and adjust it to the conditions in his dyehouse.

The Nydyes were marketed about the time when the 15-denier monofilament was being introduced. The Nydyes yield a good union between the welt and main and produce all the heavy shades with a minimum of dye. They are somewhat superior in washing to the conventional acetate dyes on nylon. However, the fastness to light is not very good. It is especially the red element that disappears, leaving an objectionable greenish shade.

The Nydyes are deficient in their affinity to level off. This was well illustrated by knitting swatches of fabric in which yarn from approximately 12 different cones of 40-denier, 13-filament yarn was knit into one piece. If one swatch is dyed with Nydyes and another one with the conventional acetate dyes, greater dye differences are observed in the stockings with Nydyes. Most of you, I believe, are aware of these differences if you perchance are in close contact with the pairing department.

Our dyeing procedure with Nydyes was about as follows:

The scoured goods are run in a bath containing the dyeing assistants for a period of 15 minutes at 130°F. This allows ample time for the assistants to become part of the stocking. The Nydyes are added, and, after dyeing is conducted for five minutes at 130°F., the temperature is raised from 130°-160°F. in 15 minutes. Dyeing is continued for an additional 60 minutes at 160°F. before sampling. We have obtained excellent results using a sulfated fatty alcohol and a nonionic wetting agent in the dye bath. In other words, we are firm believers in dyeing in a retarding dyebath.

An interesting experiment was conducted with dyeing assistants that are not too closely related. We used a sulfonated castor oil, nonionic wetting agent and a cationic amine in separate dyeing baths. After the regular dyeing procedure the dyed stocking showed that the sulfonated-castor-oil dyeing was better exhausted than the nonionic. The cationic amine prevented any color from remaining on the nylon fiber and precipitated the dye in the dyebath. Good unions were obtained with both sulfonated castor oil and the nonionic wetting agent. The nonionic wetting agent has the better property of retarding the Nydyes, which apparently require retardation to function satisfactorily.

Several dyestuff companies recommended direct-dyeing colors for 15-denier monofilament. The dyeing assistants recommended were usually sulfated fatty alcohols, and either ammonium chloride, ammonium sulfate or Glauber's salt. Ammonium chloride or ammonium sulfate did appear to give better tinctorial value and uniformity than Glauber's salt. Slightly better unions were obtained with the Glauber's salt, but twice the amount of dyestuff was required for the same shades.

Most tests that we made required a dyeing temperature between 170-200°F. in order to obtain tinctorial value. However, the goods after finishing had a crushed appearance, an undesirable condition which we all are trying to eliminate. Furthermore, the results showed that these direct dyestuffs bring out denier differences and yarn irregularities, and thus are not satisfactory.

In dyeing 15-denier monofilament hosiery we experimented with the following chrome colors:

Calcochrome Red 650
Calcochrome Brown RH
Calcochrome Yellow FC
Calcochrome Black F Conc.

Separate dyeings of each color were made in the presence of sulfated fatty alcohol as the dyeing assistant. The dyeings were started at 100°F. and the temperature was raised to 180°F. No color went onto the stockings, however, until an addition of 5 per cent of acetic acid was made to exhaust the bath. The individual dye gave satisfactory unions between the multifilament and monofilament yarns.

When combination dyeings were made with the four chrome dyestuffs above and with acetic acid and sulfated fatty alcohol as assistants, the black was the only dyestuff that exhausted from the bath. Changing the pH from 4.7 to pH 8.5 did not help to exhaust the brown and red. Adjustment of the pH of the bath to 6.9 failed to change the situation. Raising the dyeing temperature from 180 to a boil failed to exhaust the dyebath. Prolonged boiling caused the small amount of dyestuff that was on the welt and main yarn to migrate to the monofilament yarn. In these trials with combinations, 5 per cent of acetic acid was added at the start of the dyeings. The rate of exhaustion was not uniform and control of dyeing was difficult. After the stockings were worked in the dye bath a short time, the dyestuff was exhausted from the bath; however, a longer dyeing cycle removed some of the color from the stockings.

Neutral silk dyeing colors, such as
Neutral Silk Black BB,
Neutral Silk Brown R and
Fast Silk Yellow G

when dyed in either a neutral, acid, alkaline or Glauber-salt bath, produced excellent unions. However, several objections are to be found with these dyestuffs. The individual and combination dyeings brought out denier differences and yarn irregularities, especially in the multifilament yarn. This condition naturally increases the percentage of irregulars. Another objection to these dyestuffs was the difficulty of matching shades. It was practically impossible to control additions, as they do not level and at high tempera-

ture are hazardous. When the shade was too heavy, it was difficult to soap it down and so to adjust the shade.

We have very little experience using the Dunn method, but in conversation with other dyers using the method various opinions have been elicited as follows:

1. Some claim that a better union between welt and boot is obtained by this method.

2. In some instances there is considerable bleeding of the dyestuffs at the higher temperature and pressure.

3. Some of the dyestuffs are not ground fine enough and are causing blue spots during the preboarding operation.

20-DENIER MONOFILAMENT HOSIERY—The problem that confronts the dyer on 15-denier monofilament is reversed with 20-denier monofilament nylon, in so far as the multifilament welt dyes heavier than the monofilament nylon. Considerable experimental work has been done to establish a proper balance between welt and main and more research work must be done.

Our approach to this problem was started by making individual dyeings of acetate dyes, Nydyes and neutral silk-dyeing colors. One-quarter per cent dyeings were made with sulfated fatty alcohol and acetic acid in the bath at a pH of approximately 4.5. One-quarter per cent dyeings were also made in the presence of sulfated fatty alcohol and trisodium phosphate at a pH of approximately 10.5.

The problem of dyeing this combination of yarns was approached from the following angles:

A—Temperature
B—Acid, alkaline and neutral dyebaths
C—Various dyeing assistants
D—Various groups of dyestuffs and combination of groups.

Experiments were conducted with acetate dyes at 130°F. and at 180°F. under the following conditions: (a) 4 per cent of sulfated fatty alcohol and 2 per cent of acetic acid, 56 per cent, this bath having an approximate pH value of 4.3; (b) dyeing with 4 per cent of sulfated fatty alcohol and 2 per cent of trisodium phosphate with an approximate pH of 10.3. The results of both kinds of dyeings at both temperatures were the same, the welt being a bright orange and the boot a brown, showing that the blue element migrates freely. A greater percentage of dye exhausts from the acid bath than from the alkaline bath.

Various dyeing assistants, such as solvents, dispersing agents and wetting agents were tried with the basic thought of establishing a good union. Some will be listed in order to help anyone that might be interested in continuing this type of work. They were the following:

1. Detanol
2. Merpol
3. DuPonol D
4. Igepon T
5. Triton N-100
6. Deceresol OT
7. Tergitol No. 7
8. ammonium sulfate
9. diethylene glycol
10. tannic acid
11. Polyethylene Glycol 400 Mono Laurate
12. Sulfatate B
13. Dioxane
14. glyoxal
15. Tergitol P-28
16. Neutronyx 330
17. Neutronyx 560
18. Carbitol
19. Morpholine
20. soap
21. trisodium phosphate
22. acid sodium phosphate

All dyeings were started at 100°F., the temperature was then raised to 180°F., and dyeing was continued one hour at 180°F. before sampling.

The results with all the above assistants were about the same. The welt yarn (40-denier, 13-filament) had a yellow-orange cast and the main had a blue-purple cast. The dyestuffs used for these experiments were:

Acetamine Yellow N
Acetamine Scarlet B
Celanthrene Brilliant Blue FFS Conc. 200 per cent

Some dyers are working under the theory that in order to obtain a union a strongly alkaline bath must be used. Tests were conducted using the following ingredients in the dye bath:

Bath	% Assts. o.w.f.	Approx. pH
A	6 soap	9.4
B	6 soap 2 caustic soda	10.8
C	6 soap 3 soda ash	10.4
D	6 soap 3 trisodium phosphate	

The balance between welt and main was destroyed after running the lot from one-half to one hour. The neutral silk dyes and the Nydyes, when used alone, gave unsatisfactory unions. The neutral silk dyes, when dyed in a neutral bath minus Glauber's salt at a temperature of 180°F., did not give complete exhaustion of all dyes used. Fast Silk Brown B failed to exhaust. Raising of the temperature to 200°F. did not improve the condition. The addition of a small percentage of acetic acid helped to exhaust the brown but failed to improve the union.

There are two combinations of dyestuff that gave promise to help produce fair unions. The one combination contained the following dyestuffs:

Fast Silk Yellow G
Fast Silk Brown R
Neutral Silk Black BB
Acetamine Yellow N
Acetamine Scarlet B
Celanthrene Brilliant Blue FFS 200 per cent

The dyes were worked in the following baths:

Bath	% Assistants o.w.f.	Approx. pH
A	4 sulfated fatty alcohol	7.9
B	4 sulfated fatty alcohol 1 acetic acid, 56%	5.2
C	4 sulfated fatty alcohol 10 tannic acid	5.4

The unions obtained with these various dyeing assistants were quite good, as anyone can see by personal examination after the meeting.

The second combination of dyestuffs, which gave even better unions than the first, was the following:

Acetamine Yellow N
Acetamine Scarlet B
Celanthrene Brilliant Blue FFS 200 per cent
Nydye Blue GB

All dyeings conducted with the last two combinations above were made in the presence of 4 per cent of sulfated fatty alcohol o.w.f. The dyeings were started at 120°F., the temperature was raised to 180°F., and dyeing was continued at 180° F. for one-half hour. To study the migration of dyestuff the dyeings were run for periods of 2½ hours. These experiments were all repeated with a final dyeing temperature of 160°F. The unions at the lower temperature were even better than those obtained at 180°F.

FINISHES—Most textile fibers and fabrics possess certain characteristics, such as raised filaments or slight manufacturing defects, which can be corrected by mechanical means or chemical treatment to produce first quality merchandise. In order to help correct these irregularities, chemical finishes were developed and marketed.

Not too many years ago textile finishers used as finishing agents gum, glues, waxes and starches. Today they have been replaced to a large extent by synthetic resins. The synthetic resins fall into two main classes, the thermosetting and the thermoplastic resins. The hosiery industry is primarily interested in the latter, because they soften upon heating and remain in that condition until cooled.

In the present-day market you will find the following resins recommended for hosiery finishing, namely:

A—Polyvinyl type with modifications
B—Acrylic
C—Polystyrene

The polyvinyl resins give a firm, dry, crisp hand. The acrylic and the poly-

styrene, when used alone, give a soft, damp, limp hand. When they are used in conjunction with the polyvinyl type, the hand is improved, but it still retains a certain degree of softness and limpness. With the polyvinyl type, satisfactory finishes can be obtained by varying the percentage from 3-6 per cent on the weight of goods and nets. With the acrylic type 8 per cent or over does not add any greater value in appearance or snag resistance. The same is true for the polystyrene type. Some processors believe a superior finished product is obtained if the final drying or boarding operation is carried out at a temperature of 170-200°F., the resin thus flowing more freely and thereby spreading itself around the fiber.

Other finishers claim that the best hand and most excellent layout is obtained when the drying temperature does not exceed 150-160°F.

Up to the present I have not seen a finish that satisfactorily dulls 15-denier monofilament stockings or that could be relied upon in successive dyeings. The finishes that have been recommended for dulling are mostly of the inorganic type, very similar to the dulling agent employed on silk.

When making physical tests of resin finishes we have followed and used the sandpaper method developed by Dr. Smith of DuPont. For 30- and 20-denier multifilament stockings we employ a 3/0 sandpaper. For 15-denier monofilament we obtain best results with a 2/0 sandpaper.

CONCLUSIONS

1—The conventional acetate dyestuffs are the best for most depths of shade on 15-denier monofilament hosiery, provided the proper controls are set up.

2—The ideal 15- or 20-denier monofilament stocking is one that is made entirely of monofilament yarn.

3—In order to dye a satisfactory union on 20-denier monofilament nylon yarn a great deal of work lies ahead for all of us.

4—Dyers are hoping that dye manufacturers will develop a new group of dyestuffs to relieve the finishers of some of the present problems.

5—We hope to see a 15-denier monofilament yarn that will contain a higher percentage of titanium dioxide in order to provide a better dyeing index between monofilament and multifilament yarns and also help to reduce the high luster noticeable with this type of nylon yarn. We hope it can be accomplished without reducing the strength of the yarn too much or affecting the elongation.

6—The synthetic-resin field has made great strides in hosiery finishes, but much remains to be accomplished to improve the appearance of a full-fashioned stocking.

DISCUSSION

Question: Were migration tests similar to those made with various alkalies made with various auxiliaries or at pH values below 7?

Mr. DeTurck: No.

Question: Have foaming agents been of help to improve the level dyeing of hosiery?

Mr. DeTurck: We did try one experiment of a nonfoaming against a foaming agent. When the temperature of the dyeing with the foaming agent reached 160°F., we had only compressed air and foam in the machine; all the solution had gone overboard.

Question: Is a nonionic assistant better than water in the promotion of level dyeing?

Mr. DeTurck: The nonionic assistant certainly does slow down dyeing, but there is danger of using too much of it. I favor the nonionic assistant over water, however.

Question: Were Nydyes and acid dyes used only in 50-50 proportions in your experiments?

Mr. DeTurck: We varied the proportion according to the shade. The answer to good dyeing, however, depends upon other factors than merely variation in proportion of Nydyes and acid dyes.

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Utica Group Attends Machinery Show

TWENTY-SIX members of the Utica Technical Institute Student Chapter attended the 1950 Textile Machinery Exhibit May 10-12 at the Atlantic City Auditorium, Atlantic City, New Jersey. The group included the following:

Armand DiMeo, Frank Dvorak, Jay Sherman, Chuke Arah, Chukwuemeka Okoye, James DeMeo, Leonard Lefkowitz, Edward Ober, Joseph Asher, George Morehouse, Helen Brown, Florence Holsten, Louis Bien, George Behrer, Anthony Caezza, Stewart Kaplan, Robert Lynch, Richard Tegtmeier, Ernest Larrat, John Keough, Jack Lashinsky, John Caradonna, Henry Wilensky, George Aumick, Irwin Lederman, and Stanley Lazarek.

The students were accompanied by members of the faculty and their wives: Director Paul B. Richardson and Mrs. Richardson, Head of the Technical Division Albert V. Payne and Mrs. Payne, Chemistry Instructor Lester Henry and Mrs. Henry, Yarn Manufacturing Instructor Frank Galligan and Weave Formation Instructor Louis F. Haage.

The purpose of the trip was two fold: to obtain equipment for the school and to acquaint the students with the latest types of machinery in the dyeing, testing and other allied fields of the industry.

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Philadelphia May Meeting Report

A MEETING was held jointly by the Philadelphia Section and the Philadelphia-Wilmington Color Group under the chairmanship of Ralph Pike on Friday, May 5th in the English Room of Kugler's Restaurant in Philadelphia.

R. L. Jones, Royce Chemical Co., as chairman of the Annual Outing committee advised the group of the detailed plans for the affair which was held at the Torresdale-Frankford Country Club on June 9th.

Harry L. Morgan of James Lees & Sons, gave a tentative program of the Meeting-in-Minature to be held by the Section at the Philadelphia Textile Institute on October 28th.

Chairman Richard B. Stehle appointed the following as the Nominating Committee to suggest Officers for the coming year:—W. F. Fancourt, 3rd, *Chairman*, A. W. Etchells, E. C. Bertolet, Prof. P. Theel, A. Felgendreger, W. Ebersold and Dr. S. G. Turnbull.

The technical session consisted of a talk by Ralph M. Evans of the Eastman Kodak Company on the subject "Seeing Light and Color."

191 members and guests attended the dinner. The technical session attracted 230.

Respectfully submitted,
THOMAS H. HART, *Secretary*

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Western New England Outing on June 23

THE annual outing of the Western New England Section will be held on Friday, June 23, at the Wallingford Country Club, Wallingford, Connecticut. A full day of entertainment is planned including golf, horseshoe pitching, darts, card games, fun and good fellowship. Numerous prizes will be awarded.

Luncheon will be available for those desiring it and a festive dinner, with choice of lobster or steak, will be served in the evening. Reservations may be made with Robert N. Brownlee, U. S. Rubber Co., Naugatuck, Connecticut.

TRADE NOTES • NEW PRODUCTS

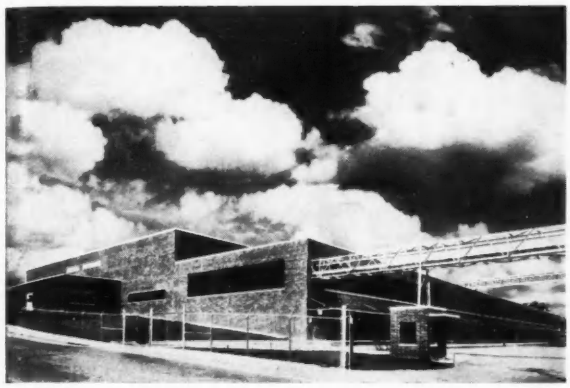


Photo by Morgan Fitz

View of Exterior of New Gregg Dyeing and Finishing Plant, Graniteville, S. C.

Photo by Morgan Fitz

Entering End of Continuous Dyeing Ranges at the Gregg Plant

• New Straightline Production Dyeing and Finishing Plant

The new Gregg plant, a division of Graniteville Company, was formally opened on May 2 at Graniteville, S. C. The new plant, a complete dyeing and finishing affair, is now set up for straightline production for a minimum of lost time and motion. The 640′ x 257′ building is constructed entirely of red brick, steel, tile and concrete.

Among the improved working conditions which the plant provides for its 550 occupants are: elimination of condensate, complete removal of heat and fumes at point of origin, scientific temperature control (summer and winter), modern lighting throughout, shower rooms, rest rooms and sanitary toilets.

All told, the new plant (the largest single project ever undertaken by Graniteville) along with its large steam plant, its equipment, the water supply and other auxiliary facilities represents a total investment of $10,000,000. The foundation was begun in January of last year and the structure completed in November.

Innovations in plant operation include: the bleaching operation, heretofore done by Graniteville in stages, now continuous in the straightline manner; all ranges driven with direct current for better speed and tension control, since compensator gates are utilized to synchronize speeds of the various sections automatically; and a highly organized laboratory, equipped for physical and chemical work. The facilities of the old laboratory were used by the Government during the war, to test and check fabrics and finishes.

The plant's facilities enable it to do all kinds of dyeing and it has equipment to do every type of finish, the company states.

J. Everett Brown, General Superintendant of Dyeing and Finishing, has been with Gregg since 1924. Walter E. Powell, Superintendent of the Gregg plant is now in his twentieth year with the organization.

• Pocket Humidicator

A precision pocket instrument, shorter than a pencil, that shows relative humidity by the accurate wet-and-dry bulb method has been developed by the Weston Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, N. J. Known as the "Tag" Pocket Humidicator Model 8704, the instrument can be used either in the hand or mounted on a wall. A built-in slide rule converts the wet-bulb and dry-bulb readings direct into relative humidity.

This new "Tag" device consists of two etched scale glass thermometers, individually hand-calibrated for permanently accurate readings. The psychometric slide rule forms the cover of this case. For use, a few drop of water are applied to the thermometer wick, and the instrument is fanned or swung for several moments. Setting the wet-bulb reading opposite the dry-bulb reading on the slide rule then indicates relative humidity.

• U. S. Testing Opens Texas Laboratory

A new wool core testing laboratory has been opened in San Angelo, Texas, which reportedly will provide west Texas wool men 72-hour service on core testing. The laboratory at 414 Webb Street is under the direction of Howard E. Ragsdill, a native of Junction, Texas.

The San Angelo laboratory will make official samplings and tests on grease wool for yield and shrinkage. It will also handle unofficial testing of samples drawn by warehousemen or other clients.

• Historical Notes

We are indebted to Dr. Frederic Dannerth, research chemist, 625 Crescent Drive, Glenside Gardens, Pa., for the following historical items on colorist's and chemist's associations:

The American Society of Dyers was organized in Philadelphia in March, 1896. The founders were John Burt, John Lockhart, W. S. Smith, Philip H. Bauer and Benjamin Firth. The purposes of this society were to advance the science of dyeing and to raise the standards of the dyer's art to the plane which it had attained in Europe. John Burt was the first president.

In 1906 the society moved to its new clubhouse at 2621 Kensington Avenue, Philadelphia and its first year book was published in 1908. It contained technical articles by Dr. J. Merritt Matthews, Dr. Frederic Dannerth and Dr. Elvin H. Killheffer.

* * *

The first American Conference of Textile Chemists and Colorists was held at the U. S. Bureau of Standards in Washington, D. C. on May 21, 1917. Dr. S. W. Stratton, Director of the Bureau, presided at the meetings.

Aerial View of the Stamford Research Laboratories of American Cyanamid

• American Cyanamid Laboratories Opened for Inspection

For the first time since they were established in 1936 the Stamford Research Laboratories of American Cyanamid Company at Stamford, Connecticut were opened to the public for inspection on May 19. The purpose of the open house was to visualize the increasingly important role that scientific research is today playing in the development of modern industry and agriculture. Among those who visited the laboratories were families and friends of employees, local business, civic and professional leaders, and the press.

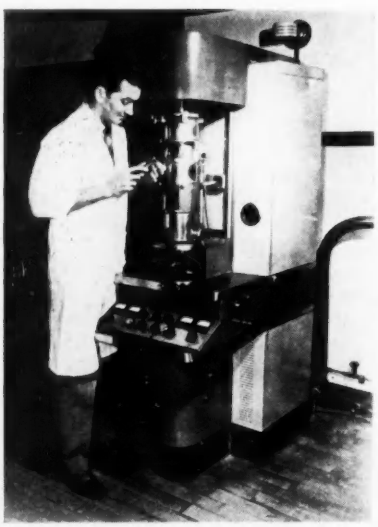
The site of the laboratories was originally used as an embroidery mill and when Cyanamid took over the building in 1936 there were 225,000 square feet of floor space which has since been expanded to more than 410,000 square feet. More than 800 laboratory personnel are now employed and the work includes pure research as well as application studies on dozens of different industries. With the major exceptions of the research and development laboratories of the Calco Chemical Division, Bound Brook, New Jersey, and the Lederle Laboratories Division, Pearl River, New York, virtually all company research is conducted at Stamford.

American Cyanamid Company was founded in 1907 to produce calcium cyanamide for fertilizer and has since expanded and diversified until it now has thirty-eight plants which produce, among other items, pharmaceuticals and biologicals, dyes and pigments, surgical sutures, plastics, heavy chemicals, fertilizers and insecticides, and industrial chemicals.

The Stamford laboratories are equipped to give all possible aid in the development of new products, testing and evaluation work, and adapting the company's products to the specific needs of its customer industries. Separate laboratories, for example, deal with such developments as chemicals for the improvement of paper, new chemicals for the flotation process of separating ores, shrink-proofing compounds and finishes for the textile industry, compounds used for the production of tires and other rubber goods, materials for the heat-treating of metals, agricultural chemicals, pharmaceutical products, and chemicals used by a wide variety of other industries.

In a two-mile tour visitors were shown numerous exhibits and demonstrations illustrating how research affects all of the company's plants and divisions. In addition, visits were made to the library and the patent department where an exhibit of patents obtained from countries all over the world is displayed. There are 16,000 books in the library and more than 400 periodicals are received each month. More than 235,000 U. S. and foreign patents are kept on file. About 600 patents have been issued to personnel of the laboratories.

Among the products developed at Stamford are melamine resins (used for plastics, wet-strength papers, shrinkproofing of fabrics, and improving leathers), acrylonitrile (a basic material for synthetic rubber and fibers), parathion (one of the more powerful insecticides), sulfadiazine, and Tagathen (a prescription antihistamine used for hay fever and asthma).



Electron Microscope Used for Picturing Ultrafine Structures at the Stamford Research Laboratories

• AOCS Elects Officers

Election of officers for 1950-51 has been announced by the American Oil Chemists' Society as follows: *president*—John R. Mays, Jr., Barrow-Agee Laboratories Inc., Memphis, Tenn.; *vice president*—A. E. Bailey, Girdler Corporation, Louisville, Ky.; *members-at-large*—H. C. Bennett, Los Angeles Soap Company, W. H. Goss, Pillsbury Mills Inc., Minneapolis, and C. E. Morris, Armour and Company, Chicago; *secretary*—H. L. Roschen, Swift and Company, Chicago; and *treasurer*—J. J. Vollertsen, retired from Armour and Company, Chicago.

Also announced is appointment of the Referee Examining Board as follows: A. S. Richardson, chairman, Proctor and Gamble, Cincinnati; R. W. Bates, Armour and Company, Chicago; J. P. Harris, Industrial Chemical Sales division, West Virginia Pulp and Paper company, Chicago, R. R. King, Mrs. Tucker's Foods Inc., Sherman, Tex. Serving ex-officio is Mr. Mays, president of the Society.

Plans for the course on drying oils at the University of Minnesota August 7-11, 1950 are moving forward, and lecturers will include S. W. Gloyer, Pittsburgh Plate Glass Company, Milwaukee; Paul O. Powers, Battelle Memorial Institute, Columbus, O.; and W. O. Lundberg, Hormel Institute, Austin, Minn.

• National Starch Indianapolis Plant Cited

The Indianapolis plant of National Starch Products Inc. has received recognition commemorating more than sixty years of continuous business activity in the city of Indianapolis. The Chamber of Commerce of Indianapolis in presenting the award cited the important part the Company has played in contributing to the material welfare of its citizens and the promotion of the city's economy.

The production of corn starch was originally started by William F. Piel, Sr. in 1867 as one of the first wet corn milling operations in the country. In 1939 the operations then known as Piel Bros. Starch Company were affiliated with National Starch Products Inc.

• Herring Appointed to N. Y. Area

Appointment of J. A. Herring as technical sales representative for Marvinol vinyl resins in the New York area has been announced by Harold M. Parsekian, manager of vinyl sales, Naugatuck Chemical division, United States Rubber Company.

Mr. Herring will make his headquarters at Naugatuck Chemical's New York office, 254 Fourth Ave. For the past nine years he has worked closely on the development, production and sale of Naugatuck's new plastic materials.

• Diazophenyl Fast Yellow 3GL

Geigy Company, Inc., 89-91 Barclay St., New York 8, N. Y. has announced the addition of Diazophenyl Fast Yellow 3GL to their Developed Color Line, which, when used with Developer Z, produces a greener shade of yellow than the types previously offered.

Diazophenyl Fast Yellow 3GL is reported to have excellent resistance to perspiration, wet fastness, washing, dry and wet pressing, dry and wet cleaning and water bleeding. Its shade and light fastness are not materially affected by urea formaldehyde finish and its wash fastness is slightly improved by it, the company states. The color is said to have excellent solubility, moderately slow and even drawing properties and good exhaustion. Acetate is reserved fairly well, and its dischargeability is outstanding, it is further stated.

Bulletins covering Diazophenyl Fast Yellow 3GL are presently being prepared, and interested parties will be put on the company's mailing list for a copy immediately on release.

• New Mixer Eliminates Whirlpool Action

Dr. Bronislaw Goldman has perfected an entirely new type of laboratory mixer now manufactured by Fisher Scientific Co., 717 Forbes St., Pittsburgh, Penna. The Fisher-Goldman Mixer, unlike mixers heretofore available, is designed specifically to break up whirlpool action to produce both horizontal and vertical mixing and is reported to perform operations in as little as one-tenth the time previously required. The resulting mixture is said to be much more homogeneous. It can be used for liquid-liquid, liquid-solid, or liquid-gaseous dispersions, the company states.

The Mixer employs slightly curved, rotating paddles (adjustable for different

Fisher-Goldman Mixer

viscosities) to effect the actual agitation. Three baffles, freely suspended in the liquid, are added to break up the whirlpool action. The paddle-baffle movement proceeds outward, upward, over, down—the liquid being "folded" into itself.

The laboratory mixer has a Pyrex jar of 3½ gallon capacity with removable stainless steel parts. The 1/6 hp. motor can be obtained for either 115 or 230 volt operation. The paddles are rotated 275 rpm. to effect vigorous stirring.

The Goldman Mixer in the laboratory size is manufactured and distributed exclusively by Fisher Scientific Company and its subsidiaries, Eimer & Amend in New York and Fisher Scientific Co., Ltd., Montreal.

• Drug and Chemical Old Timers Honored

James J. Clark, former Vice President of the Liggett Drug Co., Dr. Elvin H. Killheffer of duPont, Frank L. McCartney, former President of Norwich Pharmacal Co., Irving McKesson, former President of New York Quinine & Chemical Works, Charles A. Prickett, former Vice President of The Upjohn Company, A. A. Teeter, former Treasurer of Charles Pfizer & Co., A. A. Wasserscheid, former Vice President of Mallinckrodt Chemical Works, Herman G. Weicker, former President of Dodge & Olcott Co., and Edward Zink, former Eastern Sales Manager of Eli Lilly & Company, were honored Wednesday evening, May 10th, at a testimonial dinner at the Astor Hotel, for their long, impartial service to the drug and chemical industries.

Each was given a parchment scroll of honor by the Drug, Chemical and Allied Trades Section of the New York Board of Trade, which sponsored the dinner. Samuel W. Fraser, former American head of Burroughs, Welcome & Co., Guy L. Marsters, another former President of Norwich Pharmacal Co., and Dr. William J. Scheiffelin, former President of Scheiffelin & Co., were also tendered scrolls, but were not present to receive them.

E. T. T. Williams, President of The Lambert Company, acted as Toastmaster. Also seated on the Dais were Harold C. Green (L. Sonneborn Sons, Inc.), DCAT Chairman, C. P. Walker (Chas. Pfizer & Co., Inc.), Chairman of the Arrangements Committee, and George R. Tompkins, former Eastern Sales Manager of Parke, Davis & Co., a former scroll recipient.

The Honor Guest Committee for the dinner was composed of the following: William D. Barry, Vice President, Mallinckrodt Chemical Works; Burton T. Bush, President, Bush Aromatics, Inc.; James C. Chilcott, President, Chilcott Laboratories Division of The Maltine Company; James DeCesare, President, White Laboratories, Inc.; Philip M. Dinkins, President, Jefferson Chemical Co., Inc.; Charles L. Huisking, President, Charles L. Huisking & Co., Inc.; Joseph A. Huisking, Vice President, Fritzsche Brothers, Inc.; Percy C. Magnus, President, Magnus, Mabee & Reynard, Inc.; S. Barksdale Penick, Chairman of Board, S. B. Penick & Co.; S. Barksdale Penick, Jr., President, S. B. Penick & Co.; Edward Plaut, President, Lehn & Fink Products Corp.; John J. Toohy, Vice President, E. R. Squibb & Sons; Victor E. Williams, Director of Sales, Monsanto Chemical Co.; and E. T. T. Williams.

• Marshall New Felt Association Head

Jule F. Marshall, a past chairman of the Publicity Committee and director of The Felt Association, has been elected president of that organization at its annual meeting. The Association includes in its membership the principal manufacturers, cutters and jobbers of wool felt. Mr. Marshall is vice-president of the American Felt Company, Glenville, Conn.

Stanley N. McNeilly, Bacon Felt Company, Winchester, Mass., was elected vice-president of the Association; Herbert S. Blake, Jr., secretary, and Edward F. Kelly, treasurer.

Directors include William King, The Felters Company, Boston; Edward F. Travis, Continental Felt Company, New York; I. Goldberg, National Felt Company, Boston; and Messrs. Marshall and McNeilly.

Herbert L. Sanders

• Sanders Appointed to Chicago Post

Herbert L. Sanders has been appointed Technical Director for Ninon Laboratories, Chicago, where he will be in charge of the company's expanded activities in the field of surface-active agents and fine organic chemicals. Dr. Sanders comes from the central research laboratory of General Aniline & Film Corporation, where he was head of Technical Service.

• New Glycol and Carbowax Prices

Price reductions of 2 cents per pound for the liquid polyethylene glycols and certain Carbowax compounds (solid poiyethylene glycols) were announced recently by Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. The new prices are:

Liquid Polyethylene Glycols 200, 300, 400, 600—

In tank car or compartment tank car lots ..... 23.0c per lb.

Carbowax Compounds 1500 and 1540—

In carload or combination carload lots in 55-gallon drums ..... 29.5c per lb.

Carbowax Compound 4000—

In carload or combination carload lots in 75-pound bags .....29.0c per lb.

All prices are f.o.b. South Charleston, West Virginia.

• Over 250 Attend Wool Research Meeting

In the first of a series of meetings sponsored by The Wool Bureau to foster the free exchange of research information between the scientific laboratories and the wool textile industry, held recently at the Hotel Statler, more than 250 attended. The meeting brought together representatives of the wool textile industry and those of the Bureau of Agricultural and Industrial Chemistry, United States Department of Agriculture. The object of the meeting was to familiarize the mill men with Government wool research at the Eastern Regional Research Laboratory, Wyndmoor, Pa., and the Western Regional Research Laboratory, Albany, Calif.

The meeting was held as part of the Bureau's broad technical program for bringing the scientific laboratories and the mill executives closer together and for stimulating research in fields of most significance to the wool textile industry.

Wool grease products research, wool scouring and the chemical modification of the wool structure were the principal topics of discussion. The speakers were Dr. Harold P. Lundgren of the Albany laboratory and Dr. John T. Scanlan of the Wyndmoor laboratory. Giles E. Hopkins, the Bureau's technical director, was in charge of the program.

Advances in research to improve the utility and value of the fiber in special uses by chemical modification of the wool structure were reported by Dr. Lundgren, who also foresaw possible improvements in processing. He pointed out that a number of the chemical treatments now being studied show practical possibilities.

He also explained the work of his staff on new processes for scouring wool which might improve the efficiency of the operation. As one example, he explained how scouring by suint (the dried perspiration of sheep) salts can be made significantly more effective when controlled, small amounts of alcohol are added. Alcohol with suint not only produces higher efficiency in the removal of wool grease, he said, but it also acts to break down the wool grease emulsions, thus permitting easier recovery of the grease.

Dr. Scanlan announced that the first complete analysis of wool grease is now in progress at the Wyndmoor laboratory. The basic constituents of the grease are being determined and separated by him and Dr. W. C. Ault. When the constituents are known accurately it is hoped that some will be found which have a stable market at a price which will pay a large part of the recovery costs.

Among grease products now in use are protective coatings for precision instruments; lanolin, a basic ingredient in some cosmetics, lotions and medical ointments; and cholesterol.

• 3-Week Summer Textile Course Offered

A three-week summer course in Textiles, offering three college credits and designed for home economists, college and university teachers, clothing specialists, home demonstration agents and high school teachers, will be conducted at the Lowell Textile Institute from July 16 through August 4, it has been announced.

This course, which will be conducted in addition to the recently announced summer session in Trigonometry, Chemistry and Physics, will include instruction in five phases of the textile field with college credits given for study in Yarn Manufacturing, Weaving and Knitting, Fabrics, Dyeing and Finishing and Textile Testing.

Students in the Yarn Manufacturing phase will study briefly the properties of natural and synthetic fibers and the functions and operations used in processing fibers into yarn.

The Weaving and Knitting section will study fabric defects and methods of correction and the operation of various looms and knitting machines.

The characteristics and construction methods of cottons, woolens, worsteds and blends will be studied in the Fabrics phase and the basic principles of textile design will be covered.

Dyeing and Finishing instruction will include dye classifications, methods and properties and the methods involved in the production of finished fabrics for the trade, personal and household use.

Instruction in methods of testing cloth for color fastness, shrinkage, wear and strength properties will be covered briefly in the Textile Testing section of the course.

Field trips to various textile manufacturing units and guest lecturers on Dry Cleaning and Laundering techniques will be included in the course. Course instructors will be members of the regular Textile Institute staff.

Dormitory and cafeteria facilities will be available.

• Charlop Elected President of IMNJ

Elliott Charlop, advertising and sales promotion manager of S. Blickman, Inc., Weehawken, N. J., has been elected president of Industrial Marketers of New Jersey. The organization is a chapter of the National Industrial Advertisers Association.

Mr. Charlop is a graduate of New York University. He has been associated with Blickman since 1940.

Elliott Charlop

• First Annual EDGA Dinner

Members of the recently formed Garment Dyers Guild of America and a sizeable addition of dry cleaners, association executives and managing representatives of leading dyestuff manufacturers attended the Guild's first annual dinner meeting held at The Congress Hotel, Chicago, on March 11.

Leon Teichner, acting president, presided. After explaining how the Guild started and outlining its objectives, he pointed out that garment dyeing was an older profession than dry-cleaning but that the Guild was the youngest association in the field. Mention was made of technical articles on Garment Dyeing which appeared recently in the AMERICAN DYESTUFF REPORTER.

Walter Merdinger, Milwaukee acting vice-president, presented the speakers for the evening. They included T. E. Milholland, newly elected president of the National Institute of Cleaning and Dyeing; R. W. Staub, retiring president of N.I.C.D.; Norbert Berg, managing executive, N.I.C.D.; Albert Johnson, its director of trade relations; and Ben Rosenfield, legal council for the Guild and managing director of the Chicago Drycleaners Association.

• Rohm & Haas Price Reduction

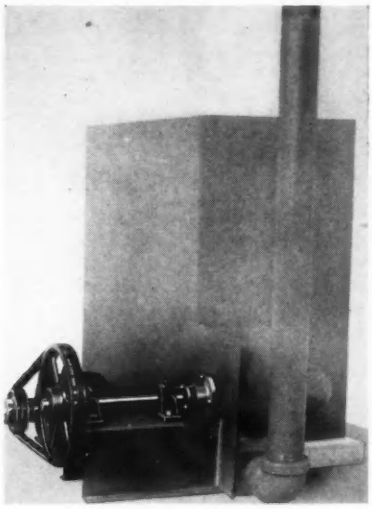
A reduction of 15% in the price of its urea formaldehyde synthetic resin for imparting crush resistant, stabilized or glazed finishes to rayon and cotton fabrics has been announced by the Rohm & Haas Company, manufacturers of chemicals for the textile industry.

The new price of the resin, known as Rhonite 610, is 8½c per pound in truck-loads; in less than truckload lots 9c per pound. The product is packed in 500 lb. drums. Prices are f.o.b. Philadelphia, with minimum transportation paid to destination.

• Textile Applications of Synthetic Waxes

Synthetic Waxes in Textile Applications is the subject matter of a two page reprint, offered free by the Glyco Products Co., Inc., 26 Court Street, Brooklyn 2, New York, which covers the use of synthetic waxes on textiles and fibers for improving slip, feel, luster, water-repellency, wear, elasticity, strength and other properties.

A wide range of synthetic waxes of varying chemical structure is described and a table of their physical properties is given. Methods for their use and a formula for a new mildewproofing composition are also included.



R&L Transfer Pump

• Stainless Steel Transfer Pump

A stainless steel, flooded suction, low head transfer pump has been announced by Riggs & Lombard, Inc., Lowell, Mass.

The pump is reported made in various sizes with capacities from 100 to 600 gallons per minute. Its simplicity of design makes the new R & L pump adaptable to a wide range of applications and almost any low viscosity liquor can be handled by it, it is stated.

Bearings are of the antifriction type and are mounted outside the case. A removable end plate makes the inside of the pump readily accessible for inspection. The drive is from a standard type motor through V-velts and sheaves.

• New Dual-Purpose Machine

Turbo Machine Company, Lansdale, Pa., has announced the development of a new machine for the hosiery industry that can be used for boarding with heated air, preboarding with steam, or a combination of both. Several of the new machines, known as the Turbo AD-48, are now reported to be in successful operation.

Turbo now has two dual-purpose machines. In the new Turbo AD-48, the finish boarding is accomplished with circulating hot air. In the Turbo VD-48, stockings are finish boarded under vacuum.

Turbo engineers developed the AD-48 especially for mills where steam pressures are not dependable and the quality of the finish boarding might be affected by fluctuating steam pressures. Circulating hot air is directed at the stocking, with more air on the welt and toe where it is more difficult to assure thorough drying.

In the Turbo AD-48, there is an air intake at the upper rear of the chamber with a fan blowing over coils which are filled with steam calculated to maintain a temperature of 220° in the chamber during finish boarding. The fan is powered by a 1 H.P. motor. A valve seals off the air intake when steam is on during preboarding. There is an opening at the lower rear of the chamber for venting air to the nearest window.

There are 48 leg forms in the Turbo AD-48, two groups of 24 forms each. The operator strips or dresses one group of forms while the other is in the chamber. Forms remain upright so that there is no chance for the fabric to creep. Forms are interchangeable on all Turbo Machines and can be changed by operating a simple clamp.

The Turbo AD-48 is priced at $4,600. Delivery is six to eight weeks.

• American Aniline Opens Charlotte Plant

Construction of a new building providing warehouse facilities, general offices, and laboratories for the Charlotte branch of American Aniline Products, Inc., has been completed according to an announcement by G. L. Armour, president of the company, from his offices in New York.

The plant, located at Hutchison Avenue and Armour Drive, represents an important step in American Aniline's plans to expand its services to textile centers in the South.

The newly occupied building, of modern design, is constructed of brick, concrete and steel, and is suitably landscaped. It is erected on a tract of land 160 feet by 310 feet, leaving room for future expansion to the rear. Over-all the new structure contains 25,000 square feet. It was designed by Mangum W. Sloan, local architect, and was constructed by Southeastern Construction Company of Charlotte.

The entrance leads into a well-defined foyer, with general administrative offices, manager's office, and sales office (all air-conditioned) leading off the foyer. The laboratory is situated in the northern section of the building, in order that all application dye tests may be correctly seen in the most desirable light.

The office flooring is of asphalt tile, with accoustical tile ceilings. The entire building is equipped with a sprinkler system and radiant floor heat.

The warehouse has been situated so that shipping and receiving can be accomplished simultaneously, with a minimum of effort and affording easy access to large trailer trucks. A pallet delivery system in the warehouse is designed to speed up delivery to the trucks. Specially de-

signed warehouse sections have been installed for products requiring special types of storage.

In the new laboratories, the company reports that it will be able to duplicate any phase of the dyeing, printing and finishing industry, and any other form of textile wet processing. They are under the direction of R. H. Nuttall.

J. Harvey Orr, longtime resident of Charlotte, is southern manager of American Aniline, having succeeded A. S. Cooley, who retired in 1948 after serving the company 24 years. American Aniline has operated office and laboratory facilities in Charlotte for the last 20 years. In addition to its Charlotte branch, the company maintains warehouse facilities at Chattanooga, Tenn. The main plant facilities are at Lock Haven, Pa., from where truckload shipments can be made to the Charlotte branch overnight.

• Fox Resigns As LTI President

The resignation of Kenneth R. Fox, President of Lowell Textile Institute, has been announced by the Board of Trustees of the Institute. Mr. Fox is relinquishing his post on June 30, 1950 to accept a position with the Burlington Mills Corporation of Greensboro, N. C. His new assignment will be one of an executive position on the President's staff.

Mr. Fox assumed the presidency of Lowell Textile Institute on June 15, 1945 and under his leadership the college embarked on a multi-million dollar expansion program. During his tenure over two million dollars have been spent on new buildings including two new dormitories, a new Alumni Memorial Library and a building to expand the educational facilities of the school. To accommodate the greatly enlarged student body consisting of over 2000 day and evening students, the faculty has been doubled and all other activities expanded to develop further the prestige and value of Lowell Textile's educational effort.

In addition to his industrial experience, Mr. Fox was formerly an Assistant Professor at the Massachusetts Institute of Technology and while there launched with two associates a highly successful consulting and research organization located in Boston. His professional and civic connections include numerous directorates and offices throughout New England.

Reports have it that Mr. Fox will assume his new position with Burlington the latter part of the Summer.

• New Building for OCC

Samuel Stott, President of the Organic Chemical Corporation, announces that ground is being broken for a new and modern two-story building in East Providence, Rhode Island.

This building is the first of a series of three units planned for the expansion of a manufacturing program for the production of dyestuffs and certain intermediates for the textile, leather and paper trade.

It reportedly will contain a large and modern laboratory, offices and manufacturing equipment. The railroad siding adjoining the property will facilitate the storage of chemicals necessary in this manufacturing program, the company states.

Occupancy is expected sometime this summer.

• Two-Package Water Repellent

A two-package water repellent, a product of the Atlantic Chemical Co., Inc., Centredale, R. I., when mixed in one bath reportedly overcomes specking and foaming due to poor and unstable emulsions.

The Atco products making up the package are Atco-Dri-A and Atco-Dri-B. They are mixed by stirring 5% of Atco-Dri-A into a full volume of water at 160°F., after which the Atco-Dri-B is stirred in. This solution is padded onto the cloth, dried and silk calendered. Atlantic reports that many plants are now running this process efficiently and successfully, and with no marking-off difficulties. They further report that the finished fabrics have a soft, silky hand and a very high spray rating.

Full details and sample products are available.

• Three New APCC Board Members

John Paul Remensnyder, president of Heyden Chemical Corporation, New York, and Ralph N. Lulek and Simon Askin, both vice-presidents and directors of that corporation, have joined the board of directors of American Potash & Chemical Corporation.

John P. Remensnyder

Ralph N. Lulek

Simon Askin

This was announced by Peter Colefax, president of American Potash & Chemical Corporation, at Los Angeles.

Mr. Remensnyder succeeds the late Bernard R. Armour as board member, while Dr. Lulek and Mr. Askin succeeded D. B. Keyes and Henry G. Walter, Jr., who formerly represented the Heyden Corporation on the American Potash board.

• RISD Awards

President Max W. Sullivan has awarded the National Association of Cotton Manufacturers' Medal and the Textron Fellowship to two Rhode Island School of Design seniors.

The National Association of Cotton Manufacturers' Medal was given to Gordon Frederick MacKenzie of Valley Falls, Rhode Island, as an outstanding student in the Textile Division in the Class of 1950.

The $1800 Textron Fellowship was awarded to Gilbert Joseph Robinson of Calumet, Mass. It provides a year of training and experience within the rayon or other synthetic industries or other institutions immediately following graduation from the School. Mr. Robinson will report to the Nashua, New Hampshire, plant of Textron, Incorporated, on July 12.

• Visit to Bradford Soap Plant

We are indebted to Daniel R. McIver, President of the Original Bradford Soap Works, Inc., West Warwick, Rhode Island, for the following extract from a report by a student of the West Warwick High School chemistry class after a visit to the Bradford plant:

A Peak at Industry

When I visited the Original Bradford Soap Works with my chemistry class, I was amazed at its size. On arriving there, we were introduced to Mr. Bishop, a chemist at the plant who was labeled by Mr. Kelly as "The Answer Man" (and off the record—he really did know his stuff). Being well acquainted with the steps of soap making, no one had any trouble understanding what Mr. Bishop had to say. Each of us, on returning, had some different step in the manufacturing that interested us more than others.

For myself, although all I saw amazed me more and more, I think my greatest thrill came when I stood in front of the huge boilers. These provided the heat for the entire factory—to satisfy our curiosity the doors were opened and we were allowed to look into these boilers (of course, no one ventured too close because of the intense heat). And to top it all, one man had complete charge of watching these giants.

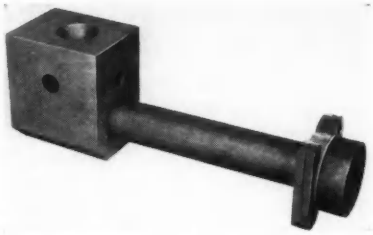
Many naturally were interested in the chemistry lab, which Mr. Bishop explained was essential to soap making. This laboratory was right up to date with the latest equipment.

Also in the line of greatest wonders came huge kettles in which the actual soap is made. These kettles are three floors deep (figure roughly that each floor is ten feet high). The mechanical operations converting liquid soap into flakes and the packing of the flakes terminated our expedition in this one field of industry — MARTHA MESSIER.

• Luck Elected to Advisory Board

Paul J. Luck has been elected a member of the Textile Advisory Board of Fairleigh Dickinson College, Rutherford, N. J.

Mr. Luck is sales manager of the Metropolitan Dyestuff Department of the Calco Chemical Division of the American Cyanamid Co. He has been associated with this firm for the past 20 years and was recently elected chairman of the New York section of the American Association of Textile Chemists and Colorists. He has been the organization's publicity chairman for the past two years.



Karbate Circulating Steam Jet

• "Karbate" Circulating Steam Jets

The Series FM-1A "Karbate" Brand Circulating Steam Jet has been announced by National Carbon Division, Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y.

The jet itself is made entirely of "Karbate" impervious graphite, while the riser is a standard "Karbate" impervious graphite pipe fitted with a Neoprene "Flexlock" gasket at the submerged connection to the jet and a Type V flange connection at the other end, said to permit simple connection to steam lines. The construction is designed for resistance to the corrosive action of the liquid being heated. They are available in sizes 2 and 4, with riser assemblies up to 9'-3¾" in height, and supplement the two types of "Karbate" impervious graphite heat exchangers used for indirect heating of open tanks.

These jets are reported particularly adapted to the heating of liquids in tanks where agitation, good circulation and low cost are requisites and where dilution of the solution is not harmful. They are said to withstand the action of practically all corrosive liquids and are recommended by the manufacturer for heating acid solutions, for dissolution of lump or powder chemicals, for circulating acid solutions in ore digesters, for cooking, etc. They reportedly can be subjected to severe thermal shock without cracking, chipping or spalling.

Catalog Section M-9101 completely describes the jet and gives design, installation and operation details.

• Textile Courses for Vets

The Veterans and Reconversion Program of the Board of Education of the City of New York is offering a variety of courses in the textile field at the Straubenmuller Textile High School, 351 West 18th Street. All the laboratory and other specialized equipment of the school is available for use by trainees on the program with classes limited in size to assure individual instruction. Each course of study has been constructed to provide practical working knowledge of that phase of the textile industry. Technical and historical information is included wherever necessary.

Classes meet two evenings a week from 6.30 to 9:30 for a period of 50 weeks.

The following courses are offered: Basic Fabrics, Rayons and Synthetics, Rayons, Advanced, Woolens and Worsteds, Cotton Converting, and Dyeing & Finishing of Textiles.

A Certificate of Eligibility and Entitlement from the Veterans Administration is required for admission to the classes. However, nonveterans may enter as private students upon payment of a nominal monthly fee.

For further information communicate with William J. Kennedy, Senior Teacher, between the hours of 3:30 and 10 p. m.

• JTI Lists Rayon Definition

Under the heading, "Textile Terms and Definitions", the *Journal of the Textile Institute* (March, 1950, P133-4) includes the following:

"Rayon. In the December 1949 issue of the *Journal* the position at the end of 1949 was fully reviewed, and letters on the subject in response to the invitation printed in the *Journal* some months before were reproduced.

"At the Buxton Conference it became clear that the weight of world opinion was against the adoption of the word "Rayon" as a generic term embracing all man-made fibers. The British delegates themselves were unable to present a united front and for this reason they abstained from voting on the question. The Textile Terms and Definitions Committee at their meeting on the 19th January recommended to Council that the published definition should be withdrawn. This recommendation was approved by Council.

"Further, at their meeting on the 14th March, Council approved the following tentative definition of the term which has been agreed by the Textile Terms and Definitions Committee on the 15th February, 1950.

"*Rayon n* (or *adj.*) Regenerated fiber wholly or mainly of cellulosic origin. Note—this term includes viscose, cuprammonium, acetate, and other cellulose ester and ether fibers."

• "Tergitol' Surface-Active Agents"

A new 8-page folder entitled " 'Tergitol' Surface-Active Agents" is now available to manufacturers in the wet-processing industries from Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. Properties, uses, and specifications of "Tergitol" wetting agents 7 and P-28 and of "Tergitol" penetrants 4, 08, and EH are given. Data on average wetting

times for the different products in various acid, base, and salt solutions are presented, along with information on the effects of organic solvents on wetting time. A useful table for the selection of the most efficient "Tergitol" surface-active agent for any given application is featured.

A technical data sheet on the new "Tergitol" dispersant TMN-650 is also offered by Carbide and Carbon. A surface-active agent of the nonionic type, TMN-650 is reported to be a 100 per cent active product compatible with anionic, cationic, and nonionic surface-active agents. It is said to be useful as a wetting agent, emulsifier, and lime-soap dispersing agent, especially for any operation in which the problem of insoluble metal-soap formation exists.

Copies of "'Tergitol' Surface-Active Agents" or of the data sheet may be obtained by writing to Carbide and Carbon. Ask for F-5900 and for F-7387, respectively.

• American Dyewood Elects

A new Board of Directors and an Executive Committee for American Dyewood Company (New York) have been elected according to an announcement by David S. Fischman, President of the Parent Company, United Dyewood Corporation.

The new officers and 12 directors are: Robert H. Bailey, *Chairman of the Board;* Sidney Raynarts, *President;* Louis Dworkin, *Vice-President;* Harry R. Tisdale, *Vice-President;* B. R. Neice, *Vice-President;* Harold E. Mitchell, *Treasurer;* Fred C. Fuller, *Secretary;* Walter A. Lynch, David S. Fischman, Malcolm W. Armstrong, Alexander E. Joffe and R. G. Webster.

The management of United Dyewood Corporation changed hands at the Annual Stockholders meeting of May 4, 1950.

• Morgan Joins Mac Sales Staff

James G. Morgan of Rochelle, Illinois, has joined the sales staff of the Mac Chemical Co. of Knoxville, Tennessee, as their Western Manager. Mr. Morgan has called on the Mid-Western Textile Mills for the past twelve years.

• First New Jersey Textile School

The first textile school in a New Jersey College will be constructed and ready for classes next fall at Fairleigh Dickinson College, Rutherford, according to an announcement by Dr. Peter Sammartino, college president.

Final plans for the building, estimated to cost $150,000 including equipment, have been approved. It will contain four classrooms and an office on the first floor; a demonstration room, laboratory and preparation room on the second floor; and the basement space will be used for heavy equipment, experimental drying room, boiler room and toilets.

Herbert R. Mauersberger, director, will set up a full-time day curriculum to include such subjects as orientation courses on textiles, raw materials, textile chemistry, printing and dyeing, finishing and testing and identification of fabrics. There will also be courses in English, contemporary society, psychology, general mathematics, physics and chemistry.

At present there are 175 students in the evening textile courses at Fairleigh Dickinson, all employed in textile industries in that vicinity.

Edward T. T. Williams, chairman of the Board of Trustees and president of the Lambert Company of New York City, speaking on the prospective building project, said: "I consider this the most important curricular development at the college during the last five years. We are situated in the most concentrated and most varied textile area in the country and it is only right that there be a collegiate textile training school within the State.

• Georgia Tech "Textilrama"

Latest developments in textile machinery, equipment and supplies will be made available through the Georgia Tech "Textilrama," according to an announcement by Herman A. Dickert, director of the A. French Textile School of the Georgia Institute of Technology.

The "Textilrama" is to be located in the 3,300 square feet display hall of the new Hightower Textile Engineering Building and will feature a year-round show for periods of one to four weeks of the products of leading textile machinery manufacturers and suppliers from all parts of the country. The symbol of the show is a key and its slogan is, "The Key to the Textile Industry of the South."

School authorities are making space and electric utilities available to exhibitors without charge. The only expenses in connection with the exhibitors will be shipping and setting up charges, it is stated.

Requests for space should be made directly to Mr. Dickert, who heads a special committee which reportedly will allocate space on a first-come basis and under a policy which will prevent competing items being shown at the same time.

Complete endorsement of The Textile Education Foundation and the Cotton Manufacturers Association of Georgia for the series of exhibits has been obtained, it is reported.

It is expected that the first exhibits will be opened in a few weeks.

OBITUARY

Photo by Russels' Studio, Mt. Holly, N. J.

Alex Dubell

We are indebted to the "Eagle News", house publication of Eagle Dyeing & Finishing Co., for supplying the following:

ALEX DUBELL

ALEX DUBELL, Treasurer of the Eagle Dyeing & Finishing Co., Mt. Holly, N. J., died on April 18 at the Burlington County (N.J.) Hospital. He had had a heart attack a week before at the home of Dr. Harold E. Longsdorf. Funeral services were from the Perinchief Chapel with interment in the Mt. Holly Cemetery

Mr. Dubell was one of the Company founders, having served as Treasurer since the founding, and had also been a member of the Board of Directors. He was serving his eighteenth year as President of the Union National Bank & Trust Co., where he had been a member of the Board of Directors for more than 25 years. He was also Treasurer and member of the Board of Directors of the Northampton Textile Co., and the Southampton Textile Co. of Emporia, Va. As well as holding several other executive positions in Mt. Holly, he was at one time President of the International Rexall Association and formerly headed the New Jersey Rexall Association.

Mr. Dubell was born on August 24, 1877 on a farm near Mt. Holly. He received his secondary education at Mt. Holly Academy and was graduated from the Philadelphia College of Pharmacy in 1898.

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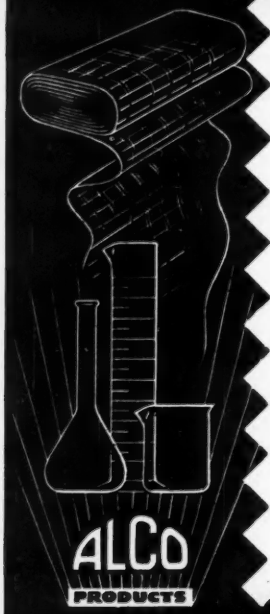

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- 2,4-Dichlorobenzaldehyde
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- Para-Chlorobenzoyl Chloride
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- 3,4-Dichlorobenzoyl Chloride
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- Para-Chlorobenzotrichloride
- 2,4-Dichlorobenzotrichloride
- 3,4-Dichlorobenzotrichloride

CHLORINATED BENZYL CHLORIDES
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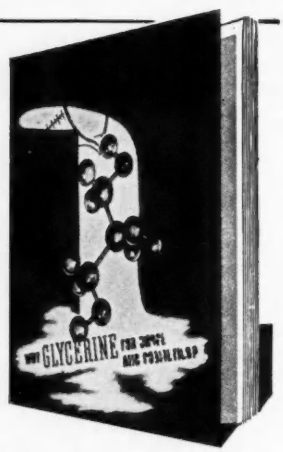

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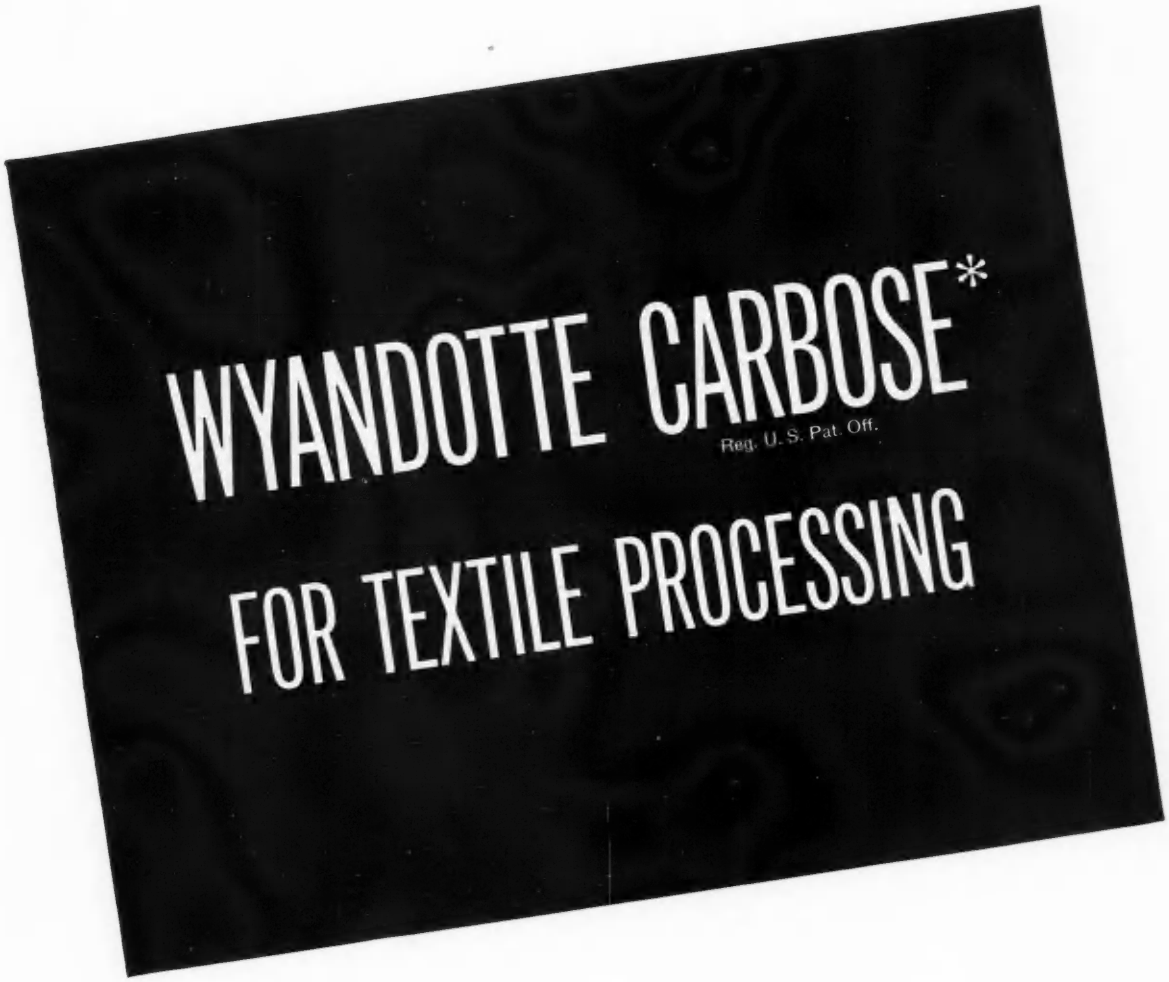

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In addition to its action as a detergent promoter, Carbose is an excellent sizing agent. As a partial replacement for starch and many types of gums used in the sizing of cotton, wool, rayon and other yarns, Carbose can gain the following advantages for you: 1. Uniform quality. 2. Ease of solution. 3. Improved adhesion of size. 4. A softer warp and better parting at the split rod without sacrifice of fiber-laying ability. 5. Reduced fiber shredding. 6. Easier removal of size.

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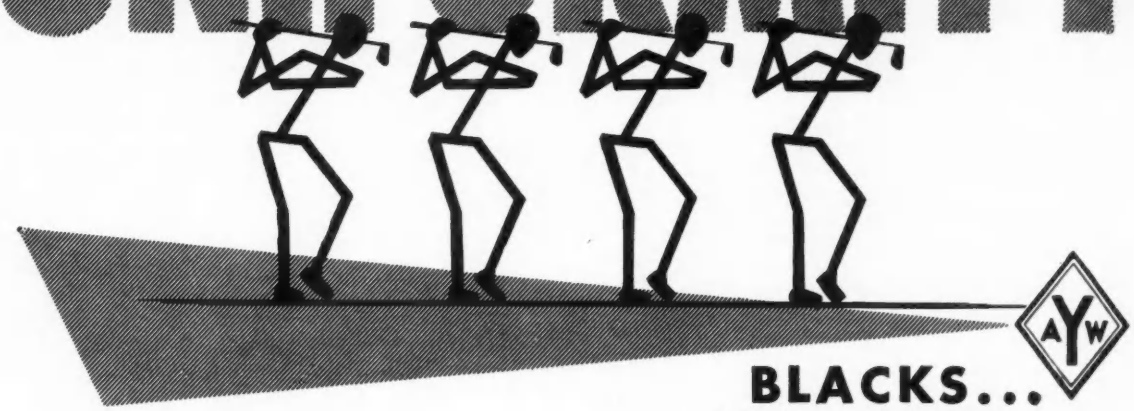

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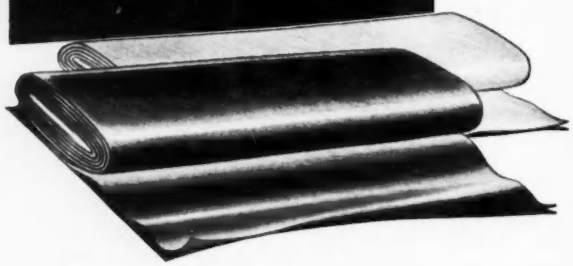

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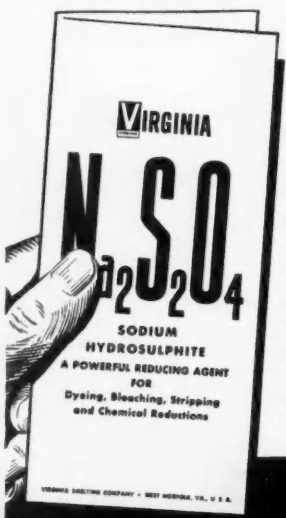

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WHEELER POINT ROAD
NEWARK, NEW JERSEY

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery wanted or for sale—the rate is $7.50 per column inch or less per insertion.

MICROBIOLOGIST-CHEMIST: Executive capacity. Specialist in prevention of deterioration, especially in textile yarns, fabrics, and chemical formulae; preservation during processing. Twenty years diversified industrial and teaching experience. Application and control testing, pilot operations, production, field promotion, research and development, laboratory and plant supervision, technical liaison. Trained in psychology and personnel problems. B.S., M.S. Age 37, married, family. Memberships in AATCC, ACS, SAB, AAAS. Desire position making good use of potential, executive or assistant. Write Box No. 844.

WANTED: Man desired to sell textile chemical specialties in established territory of Tennessee, Georgia and Alabama. Knowledge of textile processing preferable. Previous sales experience not necessary, but desirable. Write Box No. 845.

POSITION WANTED—Thoroughly experienced plant manager, dyeing, printing, finishing, box and jigg work, good executive and production planner, quality and cost conscious, thorough knowledge all equipment its purpose operation and maintenance, full understanding of trade's demands and requirements, desires connection with responsible organization. Write Box No. 846.

WANTED: Dyers for second and third shifts wanted by New England Mill. Flat or knit goods experience in dyeing synthetic and natural fibers essential. Please write details regarding background and work experience to Box Number 853.

POSITION WANTED—Capable manager with dyeing experience in woven, tricot knit, and narrow fabrics desires position in dyeing or related field. College graduate. Married. Write Box No. 855.

POSITION WANTED: Finisher for twenty-five years with nationally known plants. Experienced with all types of synthetic spun silk, nylon, and filament fabrics. Also experience with all of the types of resin finishes. Write Box No. 788.

DYER WANTED—New modern plant in North Carolina has opening for a dyer with experience, on Viscose and Acetate piece goods. State age, education, experience, and salary desired. Write Box No. 817.

WANTED—Chemist by a New England soap manufacturer. Experienced in textile, soaps and synthetic detergents. Write Box No. 861.

TOP TEXTILE COLORIST—CHEMIST (GRAD.) PLANT MANAGER available for screen or machine textile print works. 20 years successful experience matching shades for application and discharge printing with Vats, Rapidogen, Indigosols, Acetate, Acid, Basic, Direct and Aridye colors, on silks, rayons, acetates and cotton materials, having had complete charge of color shop, print floor and finishing departments. Excellent producer, will locate anywhere. Write Box No. 829.

SALESMAN WANTED to associate with two chemists experienced in the formulation and manufacture of textile chemical specialties. We can assure an ambitious man with some contacts in the field a complete line of quality products and a future in this business venture. Write Box No. 858.

SALES SERVICE—Sales service laboratory application work with various types of durable finishes on all types of textile material with a future possibility of plant demonstration work on a part-time basis. A minimum of one year of experience in a textile finishing plant. Bachelor's degree in chemistry or textile chemistry preferred. Write Box No. 859.

WANTED: Chemist with textile mill or chemical specialty manufacturing experience. Good position with old established chemical concern in New England. Write Box No. 860.

POSITION WANTED—Dyer Chemist, graduate of Textile College B. S. Techn. Two years mill experience in dyeing of hosiery yarns, wool, synthetics, cotton. Testing materials research seeks progressive position. Write Box No. 862.

POSITION WANTED—Wide research background, finishes and dyes etc., Manufacturers' representative well qualified. Write Box No. 863.

POSITION WANTED—EXECUTIVE, Chem. Engr., AATCC member, is interested to secure new position as technical sales representative or export manager. Excellent record of 20 years service in chemical industry (dyestuffs, pigments, textile chemicals and specialties). First class overseas connections. Best references. Write Box No. 864.

POSITION WANTED—Japan—Chem. Engr., experienced in textile wet and dry processes, equipment, etc., AATCC member, with many years residence in Far East and excellent contacts in Far Eastern markets is interested to accept representation of reputable manufacturer on minimum salary and commission. First class references. Write Box No. 865.

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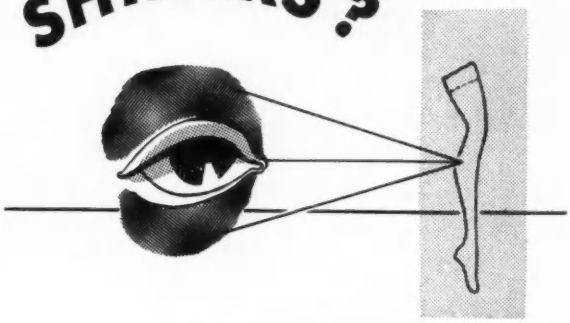

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"Shiners" are *out* when Bleached Glycerine Softener CUK goes into your 60 gauge full-fashioned machines. This one solution softens nylon sizing evenly, makes yarn more pliable for proper tension knitting. Bleached Glycerine Softener CUK may be combined with Needle Oil NE for superior needle and carrier tube lubrication. Needles and tubes are kept free of nylon size so that tube life is increased.

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Research shows differences between Catalyst AC and DAP in Resin finishing

Part of Monsanto's continuing research for more efficient, less expensive catalyst for urea and melamine resins has turned up several fundamental differences in the way Catalyst AC and Diammonium Phosphate work. Several of these differences are apparent in this simple experiment you can perform in your own laboratory.

TEST METHOD

Place equal quantities of concentrated urea resin solutions in watch glasses or foil cups.

Add 5% (on weight of resin solids) Catalyst AC to one sample, 3% DAP to other.

Evaporate both to dryness on hot plate.

With DAP—Resin soon starts to solidify, appears as white crystals in solution.

With Catalyst AC—Resin remains in solution until mixture is practically dry.

Cure both 15 minutes at 300° F. in oven.

Examine dried and cured discs.

With DAP—Disc appears as frosty, porous cake.

With Catalyst AC—Disc is translucent glassy, solid.

Break up discs into water, allow to stand several hours.

Measure pH both solutions.

With DAP—pH 2.9 (average).

With Catalyst AC—pH 4.8 (average).

Make both alkaline with soda ash solution.

Note odor.

With DAP—Fishy, amine odor, plus formaldehyde odor.

With Catalyst AC—Formaldehyde odor only.

CONCLUSIONS:

Assuming that the resin solutions behave the same way on cloth as they do in the watch glass, it is apparent that DAP causes resin to solidify into discrete particles during the drying operation, i.e., at the same time wet, swollen, rayon fiber is shrinking back to size. When Catalyst AC is used, the resin remains in solution until the fiber shrinks around it. This means that there is a greater area of intimate contact—and possibly more complete reaction—between the resin and the fiber. This difference in behavior might parallel the differences between pigments and dyestuffs.

The higher pH of AC-Catalyzed solutions means that there is less likelihood of fiber damage and, more important, less likelihood of the resins decomposing into odorous amines. Eliminating this possibility and eliminating the formation of odors when the solution is made alkaline means that Catalyst AC removes two of the possible sources of odor.

Another durable finish from the Merlon family

MERLON S for spun rayon suitings and dress goods

Merlon S is a leading candidate for the lowest-cost synthetic resin available for textile finishing. Several mills use Merlon S as a durable replacement for starch. But, more valuable than low price is Merlon's performance.

Because Merlon S does not form a film, up to 15% of the weight of the goods can be applied to spun rayons. The body and fullness of the fabric increases without undue stiffening. At the same time, a dry and lofty hand is retained or even improved.

Merlon S is one of a series of fast-selling textile resin dispersions which produce a wide variety of finishes and effects on cotton sheeting, curtains, woolen fabrics, ticking, ironing board and mattress covers, cotton denims, cotton print cloth, as well as rayon dress goods. In each case, the durability, the fullness and body, and the desired sheen is produced.

Mills find the Merlons easy to apply, as these finishes require padding and drying only. Curing and rewashing are not necessary.

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"Niaproof" Aluminum Acetate is readily soluble in water so that any strength of solution can be prepared as required.

ADVANTAGES OF "NIAPROOF" POWDER OVER SOLUTIONS:

STABILITY—No more losses due to precipitation of solutions.

PURITY—No injurious sulfates or chlorides to tender the fabric.

No contamination or discoloration from containers.

SAVINGS—Lower cost per pound of Al_2O_3 content.

Lower freight due to negligible water content.
Lower handling and storage costs.
Containers can be reused or resold.

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and

ALUMINUM FORMATE SOLUTIONS

also available

For further information write to:

Sales Offices: • *944 Niagara Bldg.* • *Niagara Falls, N. Y.*

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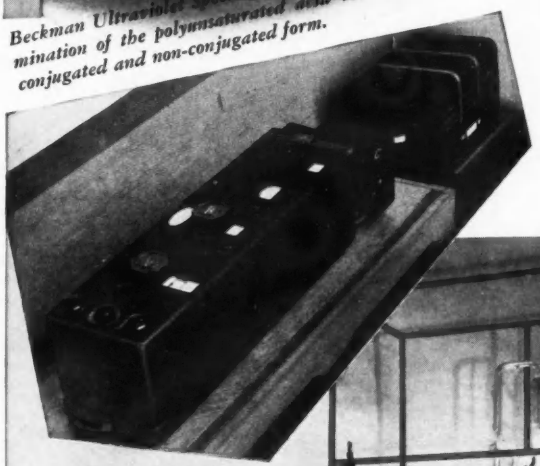

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